PHOTOFACT* FOLDER SET

*TRADE MARK

NO. 87

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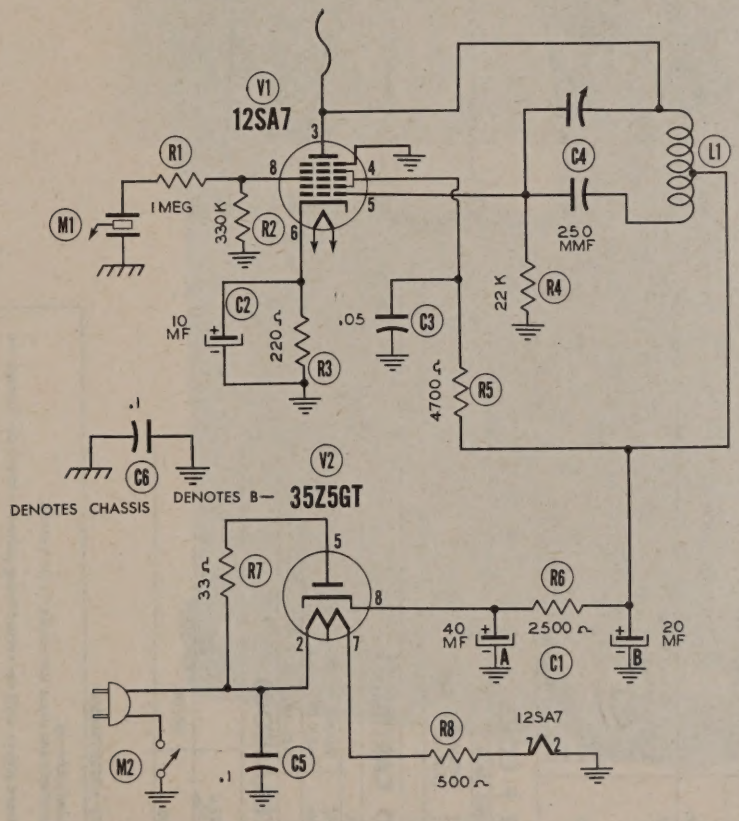
AIRCASTLE MODEL P-22

AIRCASTLE MODEL P-22

TRADE NAME	Aircastle Model P-22
SUPPLIER	Spiegel Inc., 1061 W. 35th St., Chicago, Illinois
TYPE SET	Two Tube Wireless Record Player
TUBES (TWO)	Types 12SA7 Oscillator, 35Z5GT Rectifier
POWER SUPPLY	110-120 Volts AC
RATING	.180 Amp. at 117 Volts AC
TUNING RANGE—BROADCAST BAND	



Pin No.	12SA7GT Volt.	Res.
1	0V.	0Ω
2	0V.	0Ω
3	125VDC	†2.5KΩ
4	97VDC	†7KΩ
5	§-4.3VDC	22KΩ
6	2VDC	220Ω
7	12VAC	12Ω
8	0V.	330KΩ

Pin No.	35Z5GT Volt.	Res.
1	0V.	0Ω
2	85VAC	500Ω
3	92VDC	500Ω
4	130VDC	180KΩ
5	115VAC	560Ω
6	0V.	Inf.
7	117VAC	510Ω
8	150VDC	180KΩ

† MEASURED FROM PIN 8 OF V2.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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87-1

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Oscillator	12SA7	12SA7	8R	
V2	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	150	CE-KH-4	PRS150/40-20	EDL4215		TA-240	Filter Red
B	20	150						Filter Blue
C2	10	50	CE-H-1	PRS50/10	BR105		TA-510	Output Cathode Bypass
C3	.05	400	CP-11-9	P488-05	GT4S5		TM-15	Osc. Screen Bypass *
C4	250	500	CM-251-6	1468-00025	5W5T25	GP2K-250	1FM-325	Osc. Grid Cap.
C5	.1	400	CP-01-9	P488-1	GT4P1		TM-1	Line Filter
C6	.1	400	CP-01-9	P488-1	GT4P1		TM-1	Line Isolation

* Some models use .01MFD in this application.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R1	1 Meg.	1/2	RC-105-C	BTS-1 Meg.	Series Phono Pickup
R2	330KΩ	1/2	RC-334-C	BTS-330K	Input Control Grid
R3	220Ω	1	RC-221-C	BW-1-220	Osc. Cathode
R4	22KΩ	1/2	RC-223-C	BTS-22K	Osc. Grid
R5	4700Ω	1/2	RC-472-C	BTS-4700	Osc. Anode
R6	2500Ω	1	RC-252-C	BW-1-2700	Filter
R7	33Ω	1/2	RC-33X		Rect. Ballast
R8	500Ω	20	RW-501-K	DG-500	Filament Dropping-Wire Wound

R F COILS

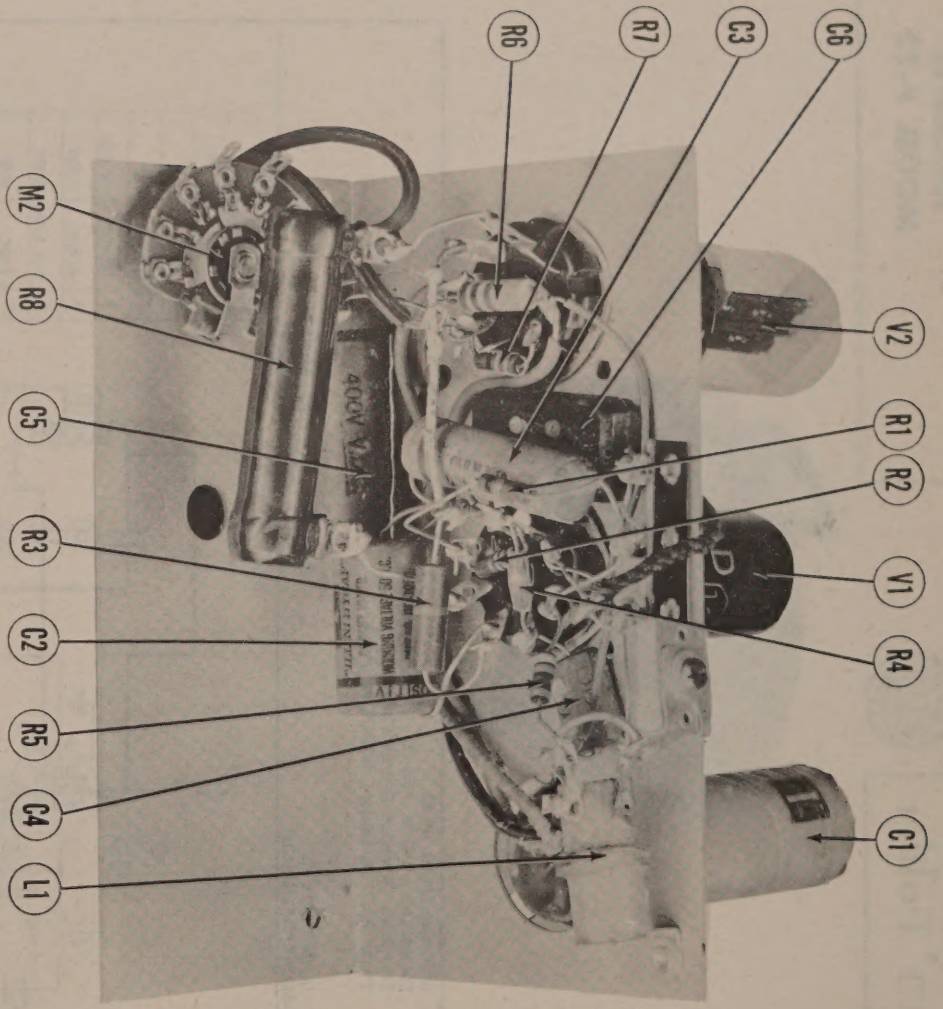
ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: MEISSNER PART No.
L1	Osc. Coil	4.2Ω			

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: ASTATIC PART No.	REPLACEMENT DATA: SHURE PART No.	REMARKS
M1	P1F13	L-92-33	W-63-MG	

MISCELLANEOUS

ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
M2	Switch		On-Off
	Cabinet	CAB-22	



FREQUENCY ADJUSTMENT

Turn on the record player and radio, allow 30 second warm up.
Place a long playing (33 1/3 RPM) record on the turntable and place the needle on the record.
Turn the radio dial to a quiet spot near 950KC.
Turn the adjustment screw on the bottom of the record player until the record being played is heard the loudest and clearest.
No other adjustment is required.

PHOTOFACT* Folder

CAPEHART MODELS
461-P, 462-P12

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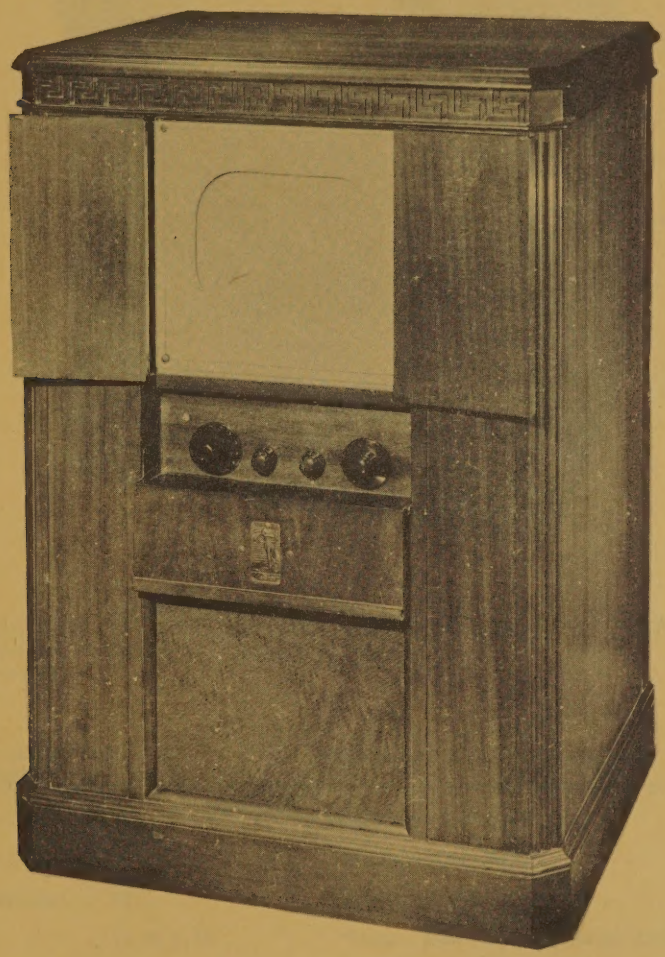
Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 461-P

CAPEHART MODELS
461-P, 462-P12

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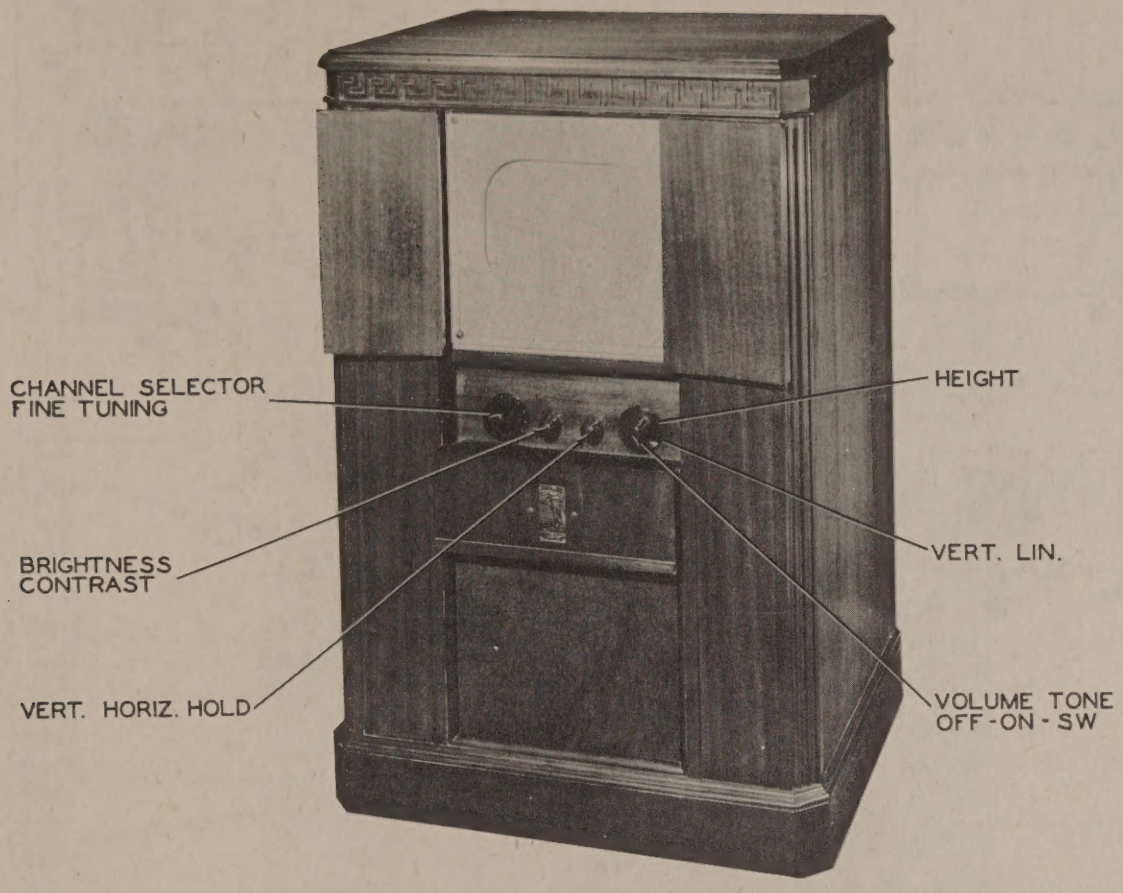
Date 3/50 Set No. 87—Folder No. 2



CAPEHART
MODELS 461-P, 462-P12

CAPEHART MODEL 461-P

TRADE NAME	Capehart Model 461-P, 462-P12 (Ch. A13, C-255, C-263, C-265, C-266, C-267, C-271,U-12, U-12-A)
MANUFACTURER	Farnsworth Tel. and Radio Corp., Fort Wayne (1), Indiana
TYPE SET	Television Receiver
TUBES	Thirty Seven

POWER SUPPLY 110-120 Volts AC-60 Cycle RATING 3.8 Amp. at 117 Volts AC
TUNING RANGE—Channels 2 thru 13

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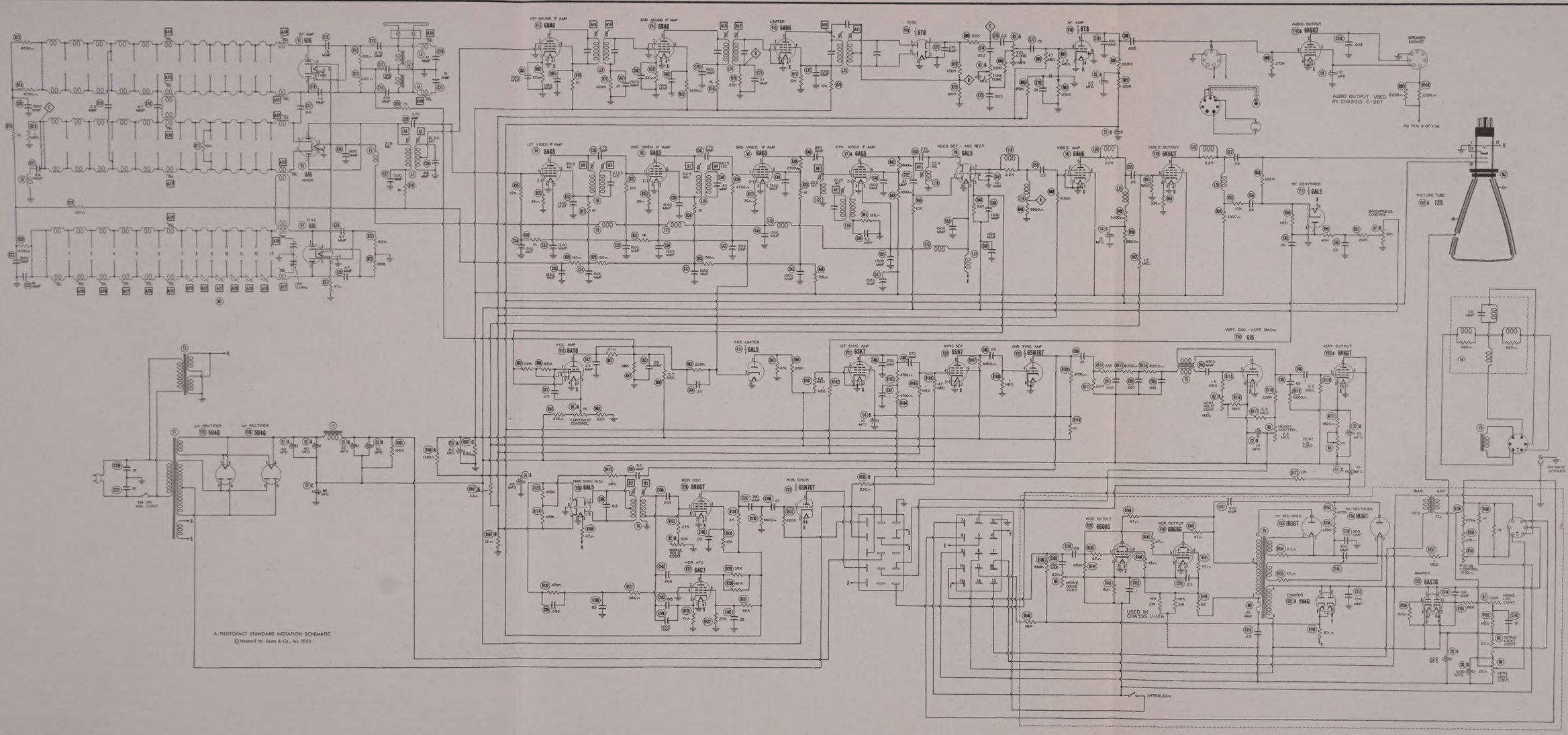
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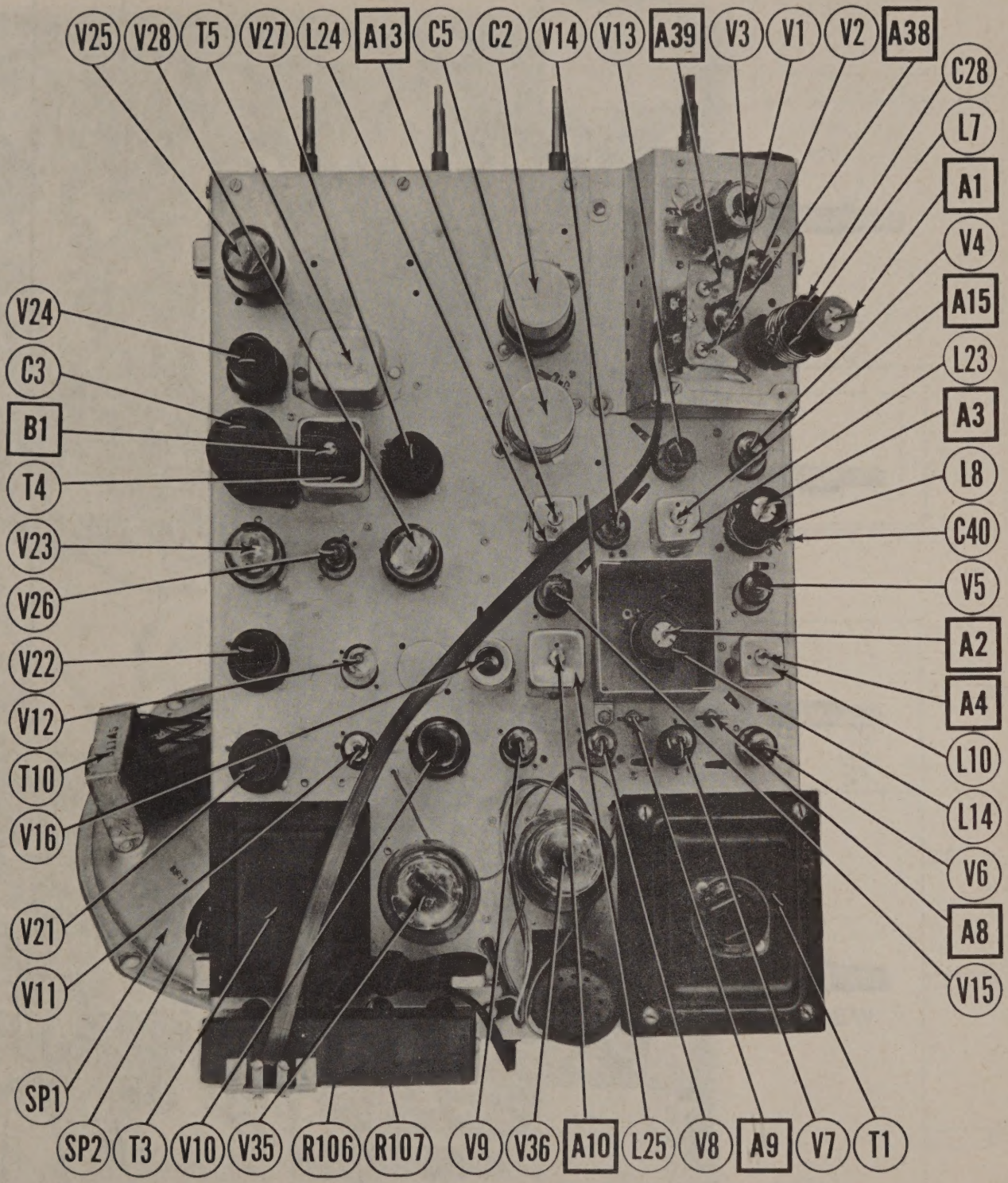
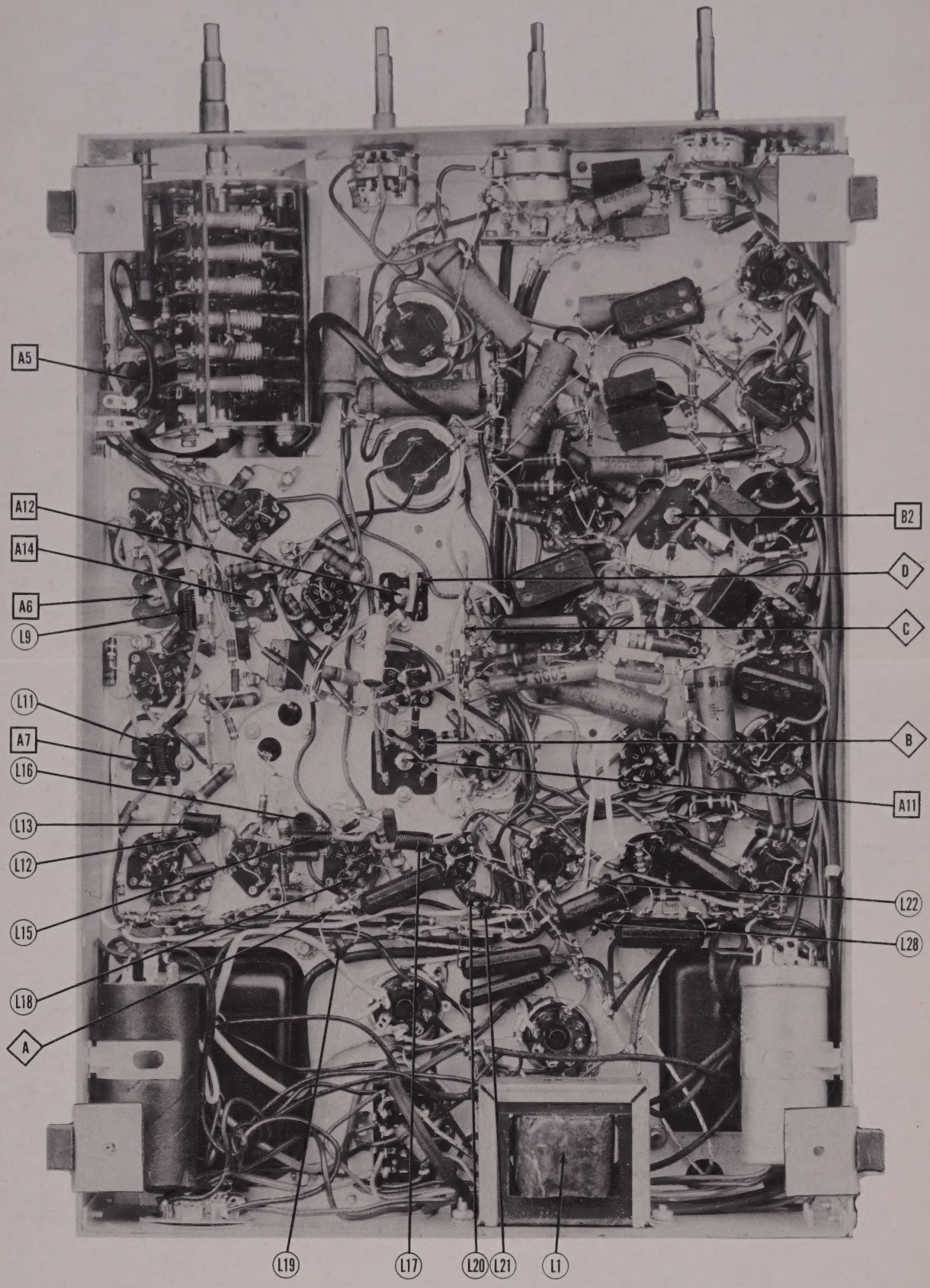
AUDIO OUTPUT USED IN CHASSIS C-267
USED IN CHASSIS U-12A
INTERLOCK

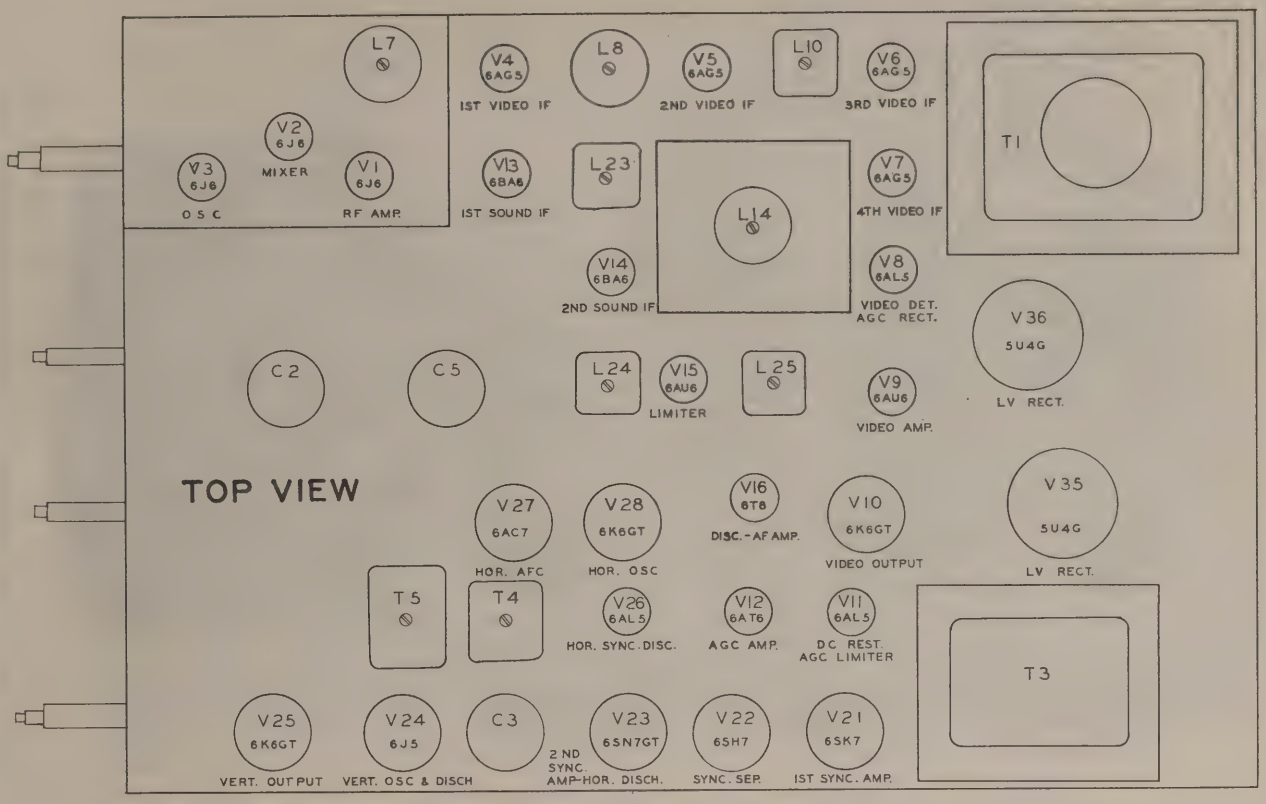
CAPEHART
MODELS 461-P, 462-P12

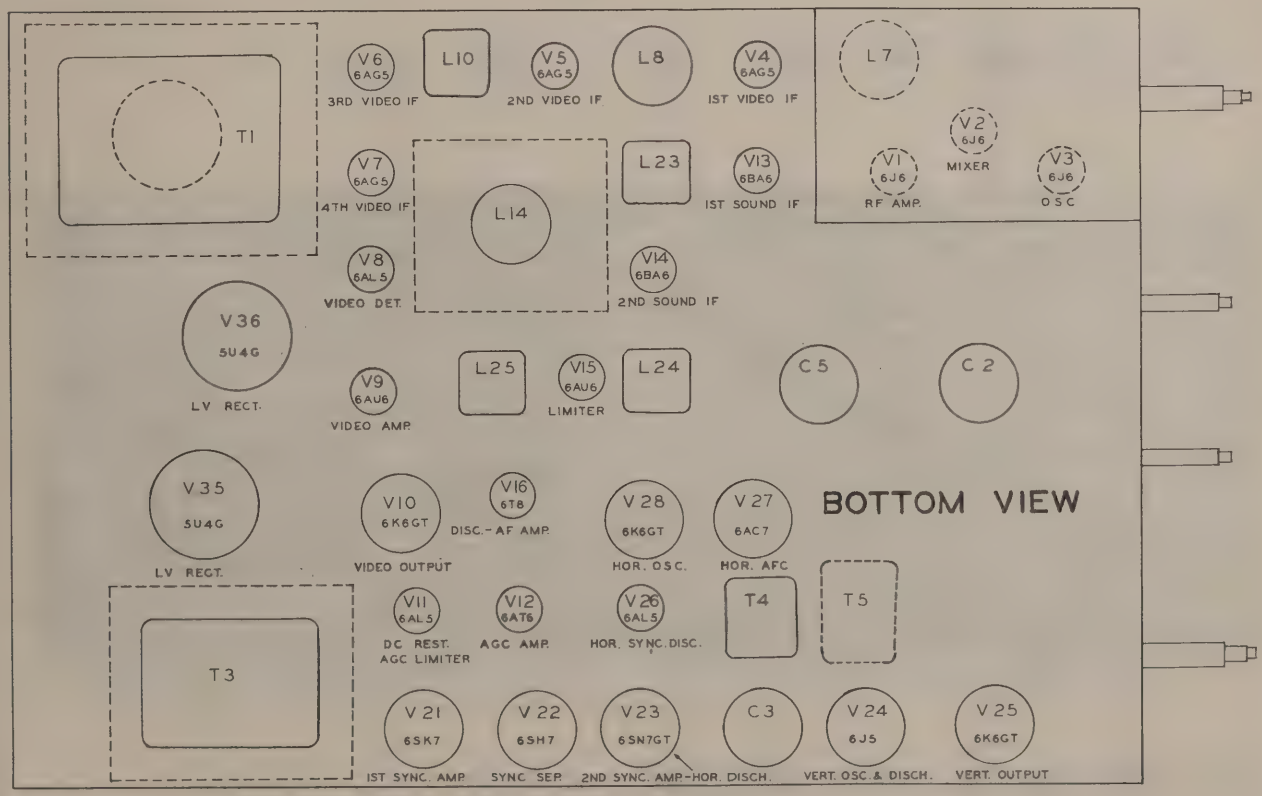


CHASSIS TOP VIEW

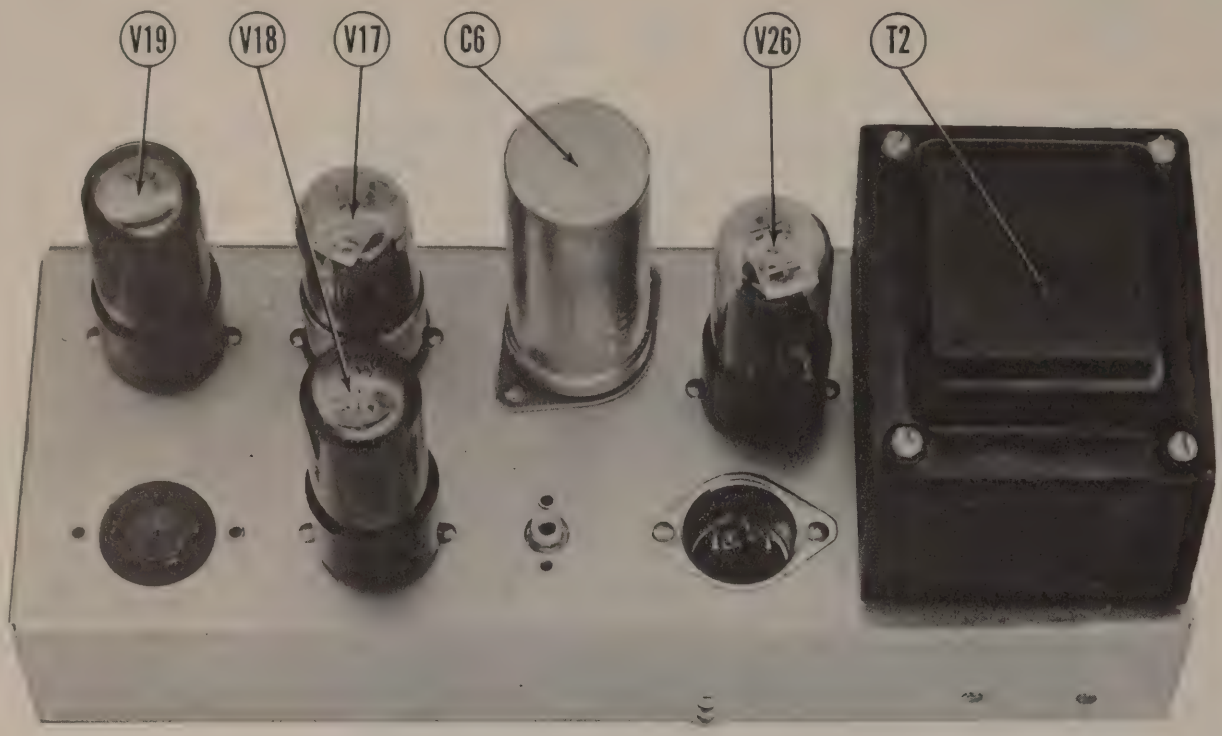


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

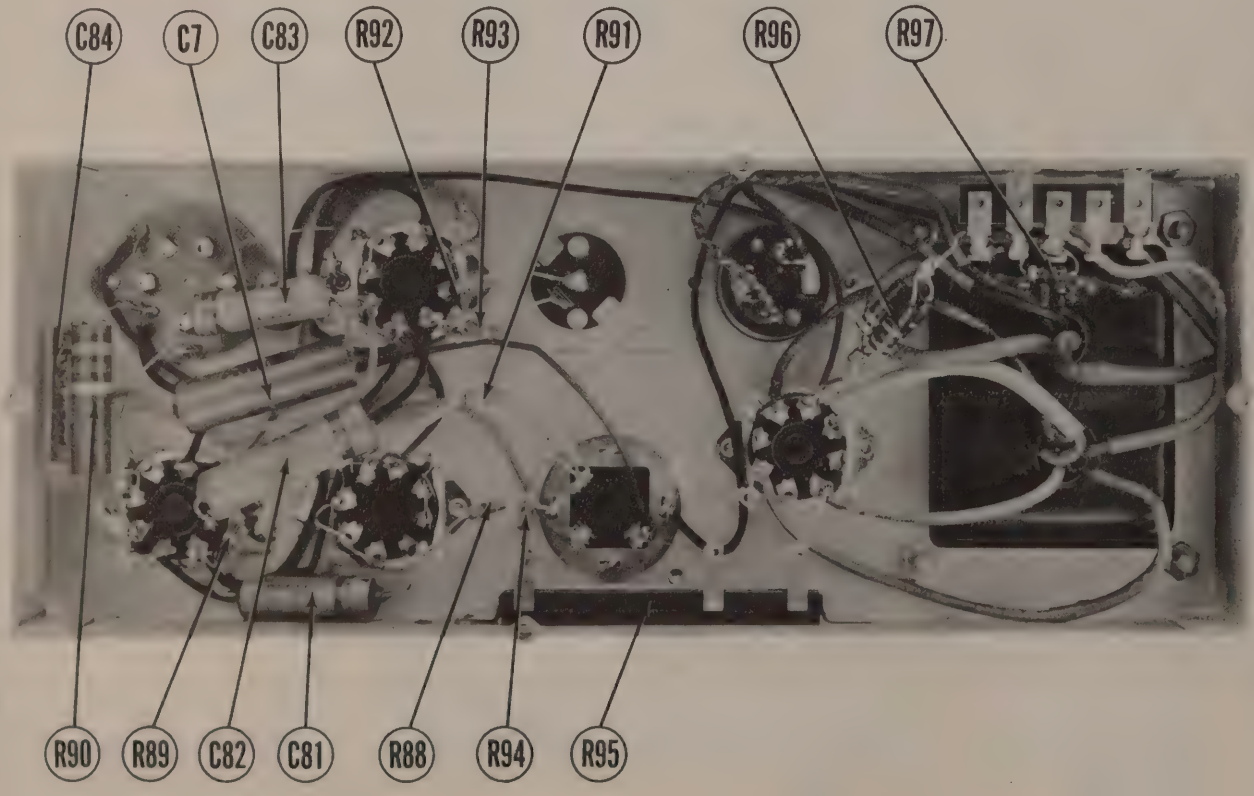




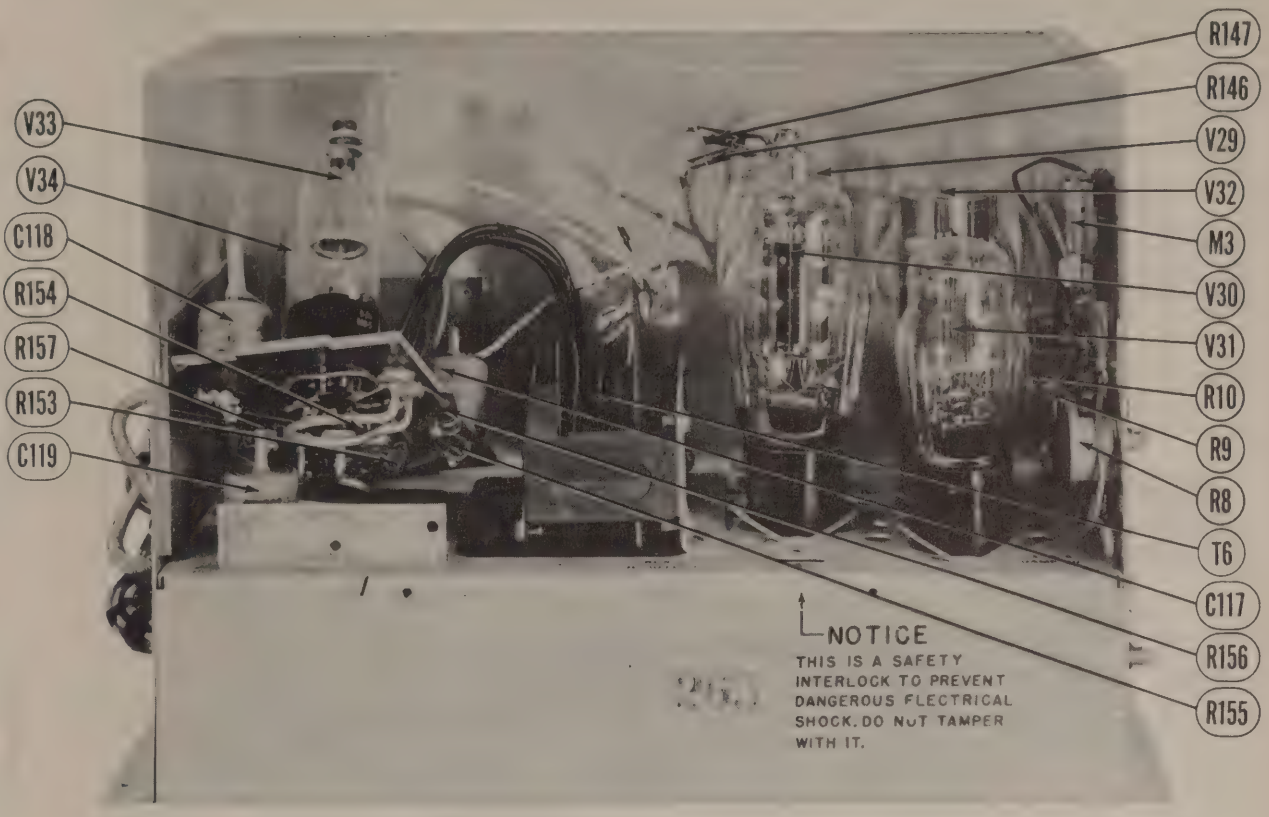
TUBE PLACEMENT CHART



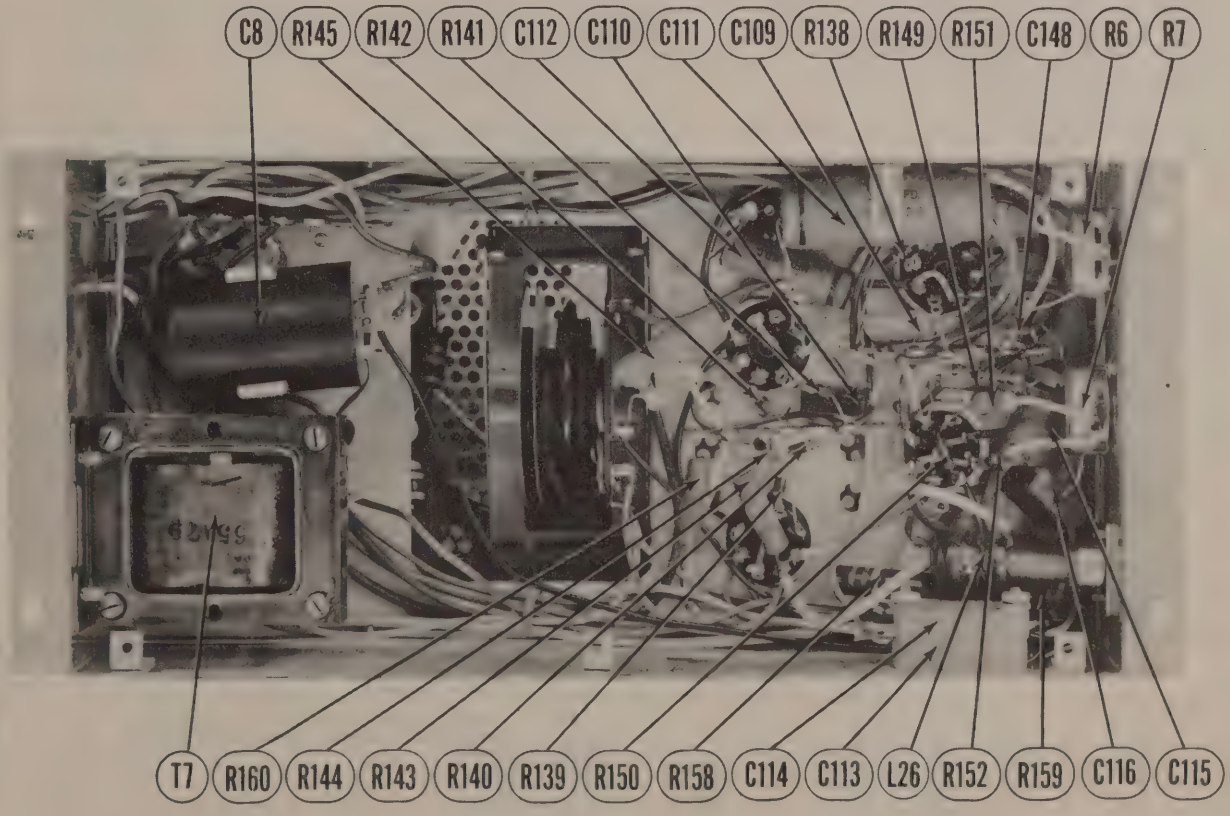
POWER SUPPLY CHASSIS-TOP VIEW



POWER SUPPLY CHASSIS-BOTTOM VIEW



HIGH VOLTAGE SUPPLY - TOP VIEW



HIGH VOLTAGE SUPPLY - BOTTOM VIEW

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

During alignment the connecting cable between the main chassis and the high voltage power supply must be in place. Make sure the high voltage lead is well isolated from the chassis.

VIDEO IF ALIGNMENT

To disable the AGC circuit, connect a short between pin 6 of the 6AT6 (V12) and pin 3 of the 6SN7GT (V23). Remove the local oscillator tube V2.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	21.25MC (Unmod.)	Any	DC Probe to Point (A) Common to chassis.	A1, A2	Adjust for MINIMUM deflection.
2.	Direct	"	27.25MC	"	"	A3	"
3.	Direct	"	19.75MC	"	"	A4	"
4.	Direct	"	21.8MC	"	"	A5	Adjust for maximum deflection.
5.	Direct	"	25.3MC	"	"	A6	"
6.	Direct	"	22.3MC	"	"	A7	"
7.	Direct	"	25.2MC	"	"	A8	"
8.	Direct	"	23.4MC	"	"	A9	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	24MC (10MC Sweep)	21.25MC 22.3MC 25.75MC 27.25MC	Any	Vert. Amp. to Point (A) Low side to chassis.		Check for response curve similar to Fig 1 with markers as shown. If necessary slightly retouch A5, A6, A8 and A9 for optimum response. Do not change A7 or traps A1 thru A4.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.01MFD	High side to pin 1 (Grid) of 6AU6 (V10). Low side to chassis.	21.25MC (Unmod.)	Any	DC Probe thru 1 Meg. to point (B) Common to chassis.	A10	Adjust for maximum deflection.
11.	.01MFD	"	"	"	DC Probe to Point (C) Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
12.	.01MFD	"	"	"	DC Probe to Point (D) Common to chassis.	A12, A13, A14, A15	Adjust for maximum deflection.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

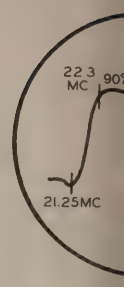
Use frequency modulated signal with 60 ~ modulation and 450KC sweep. Use 120 ~ sawtooth voltage in scope for horizontal deflection.

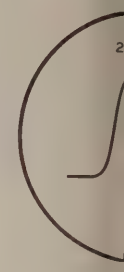
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.01MFD	High side to pin 1 (Grid) of 6BA6 (V14). Low side to chassis.	21.25MC (1MC Sweep)	21.25MC	Any	Vert. Amp. to Point (D) Low side to chassis.	A12, A13	Adjust for maximum amplitude and symmetry as per Fig 2.
11.	.01MFD	High side to pin 1 (Grid) of 6BA6 (V13). Low side to chassis.	"	"	"	"	A14, A15	"
12.	.01MFD	"	"	"	"	Vert. Amp. to Point (B) Low side to chassis.	A11, A10	Adjust A11 so 21.25MC occurs at center of crossover lines as per Fig 3. Adjust A10 for maximum amplitude and straightness of crossover lines.

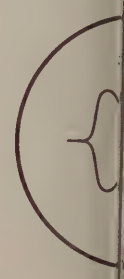
OSCILLATOR ALIGNMENT (TUNER NO. 13872)

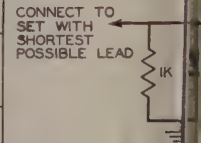
Replace the local oscillator tube (V2).
Set the fine tuning control approximately 140° from maximum counter-clockwise. This aligns the holes in the drive disc with the adjustment screws.
The signal generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
The sound IF system must be properly aligned before beginning oscillator alignment.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	215.75MC (Unmod.)	13	DC Probe to Point (B) Common to chassis.	A16, A17	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Keep slug pairs at approximately the same relative position.
14.	"	"	209.75MC	12	"	A18	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
			203.75MC	11		A19	
			197.75MC	10		A20	
			191.75MC	9		A21	
			185.75MC	8		A22	
			179.75MC	7		A23	
15.	"	"	87.75MC (Unmod.)	6	"	A24, A25	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Keep slug pairs at approximately the same relative position.
16.	"	"	81.75MC (Unmod.)	5	"	A26	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
			71.75MC	4		A27	
			65.75MC	3		A28	
			59.75MC	2		A29	









ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

During alignment the connecting cable between the main chassis and the high voltage power supply must be in place. Make sure the high voltage lead is well isolated from the chassis.

VIDEO IF ALIGNMENT

To disable the AGC circuit, connect a short between pin 6 of the 6AT6 (V12) and pin 3 of the 6SN7GT (V23). Remove the local oscillator tube V2.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube (V2) Low side to chassis	25.25MC (Unmod.)	Any	DC Probe to Point (A) Common to chassis.	A1, A2	Adjust for MINIMUM deflection.
2	Direct	"	27.25MC	"	"	A3	"
3.	Direct	"	19.75MC	"	"	A4	"
4.	Direct	"	21.8MC	"	"	A5	Adjust for maximum deflection.
5.	Direct	"	25.3MC	"	"	A6	"
6	Direct	"	22.3MC	"	"	A7	"
7.	Direct	"	25.2MC	"	"	A8	"
8	Direct	"	23.4MC	"	"	A9	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis	24MC (10MC Sweep)	21.25MC 22.3MC 25.75MC 27.25MC	Any	Vert. Amp. to Point (A) Low side to chassis.		Check for response curve similar to Fig 1 with markers as shown. If necessary slightly retouch A5, A6, A8 and A9 for optimum response. Do not change A7 or traps A1 thru A4.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10	.01MFD	High side to pin 1 (Grid) of 6AU6 (V10). Low side to chassis	21.25MC (Unmod.)	Any	DC Probe thru 1 Meg. to point (B) Common to chassis.	A10	Adjust for maximum deflection.
11	.01MFD	"	"	"	DC Probe to Point (A) Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
12	.01MFD	"	"	"	DC Probe to Point (B) Common to chassis.	A12, A13, A14, A15	Adjust for maximum deflection.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ~ modulation and 450KC sweep. Use 12 ~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10	.01MFD	High side to pin 1 (Grid) of 6BA6 (V14). Low side to chassis.	21.25MC (IMC Sweep)	21.25MC	Any	Vert. Amp. to Point (A) Low side to chassis.	A12, A13	Adjust for maximum amplitude and symmetry as per Fig 2.
11	.01MFD	High side to pin 1 (Grid) of 6BA6 (V13). Low side to chassis.	"	"	"	"	A14, A15	"
12	.01MFD	"	"	"	"	Vert. Amp. to Point (B) Low side to chassis.	A11, A10	Adjust A11 so 21.25MC occurs at center of crossover lines as per Fig 3. Adjust A10 for maximum amplitude and straightness of crossover lines.

OSCILLATOR ALIGNMENT (TUNER NO. 13872)

Replace the local oscillator tube (V2).
Set the fine tuning control approximately 140° from maximum counter-clockwise. This aligns the holes in the drive disc with the adjustment screws.
The signal generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
The sound IF system must be properly aligned before beginning oscillator alignment.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	215.75MC (Unmod.)	13	DC Probe to Point (A) Common to chassis.	A16, A17	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Keep slug pairs at approximately the same relative position.
14	"	"	209.75MC	12	"	A18	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
			203.75MC	11		A19	
			197.75MC	10		A20	
			191.75MC	9		A21	
			185.75MC	8		A22	
			179.75MC	7		A23	
15	"	"	87.75MC (Unmod.)	6	"	A24, A25	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Keep slug pairs at approximately the same relative position.
16	"	"	81.75MC (Unmod.)	5	"	A26	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
			71.75MC	4		A27	
			65.75MC	3		A28	
			59.75MC	2		A29	

FIG. 1

FIG. 2

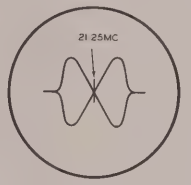


FIG. 3

FIG. 4

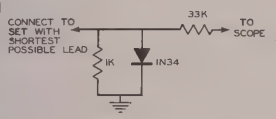


FIG. 5

FIG. 6

ALIGNMENT INSTRUCTIONS (CONT.)

RF AND MIXER ALIGNMENT (TUNER NO. 13872)

The RF and mixer lines in this tuner are normally very stable. Alignment should not be attempted unless they are definitely known to be out of alignment.
Set the contrast control to read -1 1/2 volts on VTVM connected between the junction of R67 and R68, and chassis.
Connect a .001MFD capacitor from the grid (pin 1) of the first video IF amplifier (V4) to chassis, using the shortest possible leads.
Terminate the sweep generator lead with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	213MC (10MC Sweep)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to Point (C) Low side to chassis.	A30, A31, A32, A33	Adjust for response curve similar to Fig 4 with markers above 70%.
18.	"	"	207MC (10MC SWP)	205.25MC 209.75MC	12	"		Check for response curve similar to Fig 4. If markers are below 70% on any channel, make slight adjustment of A30, A31, A32 and A33 with channel selector set for that channel. Recheck all high band channels to see that they have not been seriously effected.
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			183MC (10MC SWP)	181.25MC 185.75MC	8			
			177MC (10MC SWP)	175.25MC 179.75MC	7			
19.	"	"	85MC (10MC SWP)	83.25MC 87.75MC	6	"	A34, A35, A36, A37	Adjust for response curve similar to Fig 4 with markers above 70%.
20.	"	"	79MC (10MC SWP)	77.25MC 81.75MC	5	"		Check for response curve similar to Fig 4. If markers are below 70% on any channel, make slight adjustment of A34, A35, and A36, A37 with channel selector set for that channel. Recheck all low band channels to see that they have not been seriously effected.
			69MC (10MC SWP)	67.25MC 71.75MC	4			
			63MC (10MC SWP)	61.25MC 65.75MC	3			
			57MC (10MC SWP)	55.25MC 59.75MC	2			

WAVE TRAP ADJUSTMENT (TUNER NO. 13872)

Wave traps A38 and A39 are used for specific types of interference and their alignment will depend upon the type encountered. With the receiver tuned to the channel having the interference, set fine tuning control until interference is at maximum. Adjust A38 and A39 for minimum interference in the picture and sound, keeping the cores at approximately the same relative position. Turn one core 1/2 turn, adjust the other for minimum interference.

RF AND OSCILLATOR ALIGNMENT (TUNER NO. 13900)

Replace the local oscillator tube (V2).
Set the fine tuning control to the mid-position of its range.
Construct a detector probe as shown in figure 5, connect the detector probe to pin 1 (Grid) of the first video IF amp. (V4), using the shortest possible leads.
The trap on the converter output transformer must be properly aligned before attempting RF and oscillator alignment.
The coupling adjustment rings (A305 and A306) are pre-set at the factory and sealed and should not normally require adjustment in the field.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	213MC (10MC SWP)	211.25MC 215.75MC	13	Vert. Amp. thru detector probe to point (C) Low side to chassis. (See note above).	A311, A301, A302, A303, A304	Adjust A311 to place sound marker at bottom of dip as per Fig 6. The video marker should be above 80%. If necessary adjust A301, A302, A303 and A304 to place video marker as shown in Fig 5. Keep trimmer pairs at approximately the same relative position.
14.	"	"	207MC (10MC SWP)	205.25MC 209.75MC	12	"		Check all high band channels to see that the sound marked can be tuned to the bottom of the dip well within the range of the fine tuning control. If not compromise adjustment of A311 may be made to obtain optimum results. If the video marker falls below 70% on any channel, make slight adjustment of A301, A302, A303 and A304 with selector switch set for that channel. Recheck all high band channels to see that they have not been seriously effected.
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			183MC (10MC SWP)	181.25MC 185.75MC	8			
			177MC (10MC SWP)	175.25MC 179.75MC	7			
15.	"	"	85MC (10MC SWP)	83.25MC 87.75MC	6	"	A312, A307, A308, A309, A310	Adjust A312 to place sound marker at bottom of dip as per Fig 5. The video marker should be at 80%. If necessary adjust A307, A308, A309 and A310 to place video marker as shown. Keep trimmer pairs at approximately the same relative position.
16.	"	"	79MC (10MC SWP)	77.25MC 81.75MC	5	"		Check all low band channels to see that the sound marker can be tuned to the bottom of the dip well within the range of the fine tuning control. If not compromise adjustment of A312 may be made to obtain optimum results. If the video marker falls below 70% on any channel, make slight adjustment of A307, A308, A309 and A310 with channel selector set for that channel. Recheck all low band channels to see that they have not been seriously effected.
			69MC (10MC SWP)	67.25MC 71.75MC	4			
			63MC (10MC SWP)	61.25MC 65.75MC	3			
			57MC (10MC SWP)	55.25MC 59.75MC	2			

WAVE TRAP ADJUSTMENT (TUNER NO. 13900)

Wave traps A313 and A314 are used for specific types of interference and their adjustment will depend upon the type encountered. With the receiver tuned to the channel having the interference, set the fine tuning control until the interference is at maximum. Adjust A313 and A314 for minimum interference in both the sound and picture, keeping the cores in the same relative position. Turn one core 1/2 turn, adjust the other for minimum interference.

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

HORIZONTAL OSCILLATOR ALIGNMENT CHECK:

After turning the horizontal hold control to the maximum counter clockwise position, the picture should remain in horizontal sync. Remove the picture momentarily by turning the contrast control fully counter-clockwise and then return it to the normal operating position. This should pull the picture back into synchronization.

Now turn the horizontal hold control fully clockwise. The picture should remain in sync. Momentarily remove the signal and again the picture should pull into sync. if receiver is functioning properly.

If the receiver functions properly under these checks it is not necessary to align the horizontal oscillator circuit. However, if the picture is not normal or stable the horizontal oscillator must be aligned.

SLIGHT RETOUCH ALIGNMENT:

If the receiver failed in the above check to hold sync at either extreme of the hold control or after momentary removal of the signal, it may be possible to align the horizontal oscillator by making slight adjustments. If this fails it will be necessary to completely re-align the horizontal oscillator circuit.

Tune in a TV station and adjust tuning for best sound quality. Sync the picture and adjust the contrast control to slightly less than normal position. Turn the horizontal hold control to the point where the horizontal oscillator fails to hold or pull in. Remove signal. Turn B1 frequency adjustment (located at rear of chassis) until oscillator pulls into sync. Now check the pull-in and hold for the other extreme of the horizontal hold control.

COMPLETE ALIGNMENT:

Tune in a TV station for the best SOUND quality. Adjust VERTICAL hold control to vertically sync the picture and adjust the contrast control to slightly less than normal. Turn B1 frequency adjustment until picture syncs horizontally. If blanking bar is present on picture adjust B2 (phasing adjust screw) until blanking bar moves to the right and off the raster. If ripples occur in the raster turn B2 in a clockwise direction until the unstable condition is removed. The length of this adjustment screw in its correct position is usually about 1/2 inch beyond the bushing.

Turn horizontal hold control fully counter-clockwise and adjust B1 until picture fails to sync. Now slowly turn B1 to the point where the picture syncs again. Readjust B2 so that the left side of picture is close to the left side of the raster but does not fold over.

Turn horizontal hold fully clockwise. Right side of picture should be close to right side of raster but does not fold over. If picture does fold over, readjust B2.

When signal is restored after momentary removal of the signal, the picture should fall into sync. If picture fails to fall into sync, turn B1 counter-clockwise until picture syncs in.

Turn horizontal hold fully counter-clockwise. Picture should fall back into sync. after momentary removal of signal.

If picture fails to pull in sync after momentary removals of the signal in both extremes of the horizontal hold control, there may not be a sufficient pull-in range, though not necessarily. A pull-in of 3/4 of the hold control range should be satisfactory.

Excessive pull-in is objectionable because high control circuit sensitivity gives greater reaction to noise pulses. This may also affect the vertical sync and equalizing pulses which tend to cause a bend in the top portion of the raster.

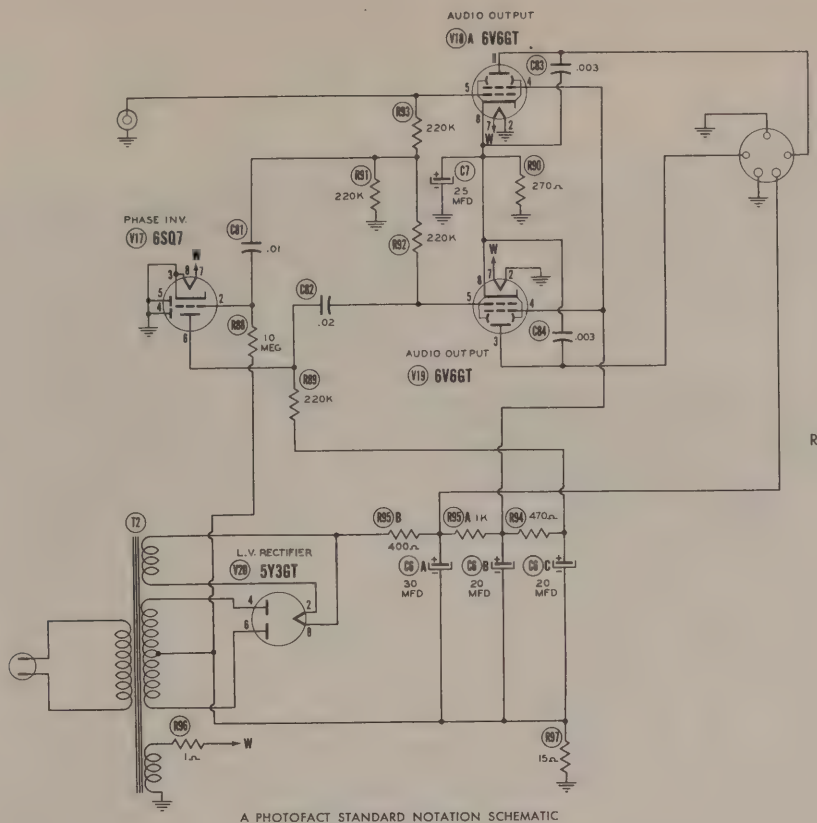
HORIZONTAL LINEARITY ADJUSTMENTS

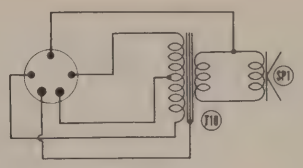
On some models of these sets, the horizontal width and horizontal linearity adjustments are slugs, on other models the horizontal linearity is a potentiometer. The latter may or may not have a horizontal width adjustment.

Turn the horizontal drive control clockwise as far as possible without crowding the right side of the picture. If the set has a width adjustment, adjust it so picture fills the mask horizontally. Adjust the horizontal linearity for best linearity of the right half of the picture. (readjustment of the horizontal drive control may be necessary for proper results). Center the picture with the centering control.

DISASSEMBLY INSTRUCTIONS-MODEL 461-P

1. Remove four push-on type control knobs.
2. Remove six screws holding rear cover. Open cover.
3. Remove two 3/16" hex head bolts holding interlock on rear cover. Remove interlock.
4. Disconnect picture tube HV cap, bare socket and yoke plug.
5. Disconnect two plugs on rear of TV chassis.
6. Loosen 1/4" hex head bolt holding ground wire on yoke. Remove wire.
7. Remove four 5/16" hex head bolts holding TV chassis. Remove chassis.
8. Free cabling from clamps and feed thru holes to their respective chassis.
9. Remove four screws holding HV chassis. Remove chassis.
10. Disconnect speaker plug.
11. Remove four screws holding audio chassis mounting board to cabinet. Remove chassis on mounting board.
12. Remove four 3/8" hex nuts holding speaker. Remove speaker.
13. Remove four 3/8" hex nuts holding picture tube. Remove tube.





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AUDIO AMPLIFIER CHASSIS A-13

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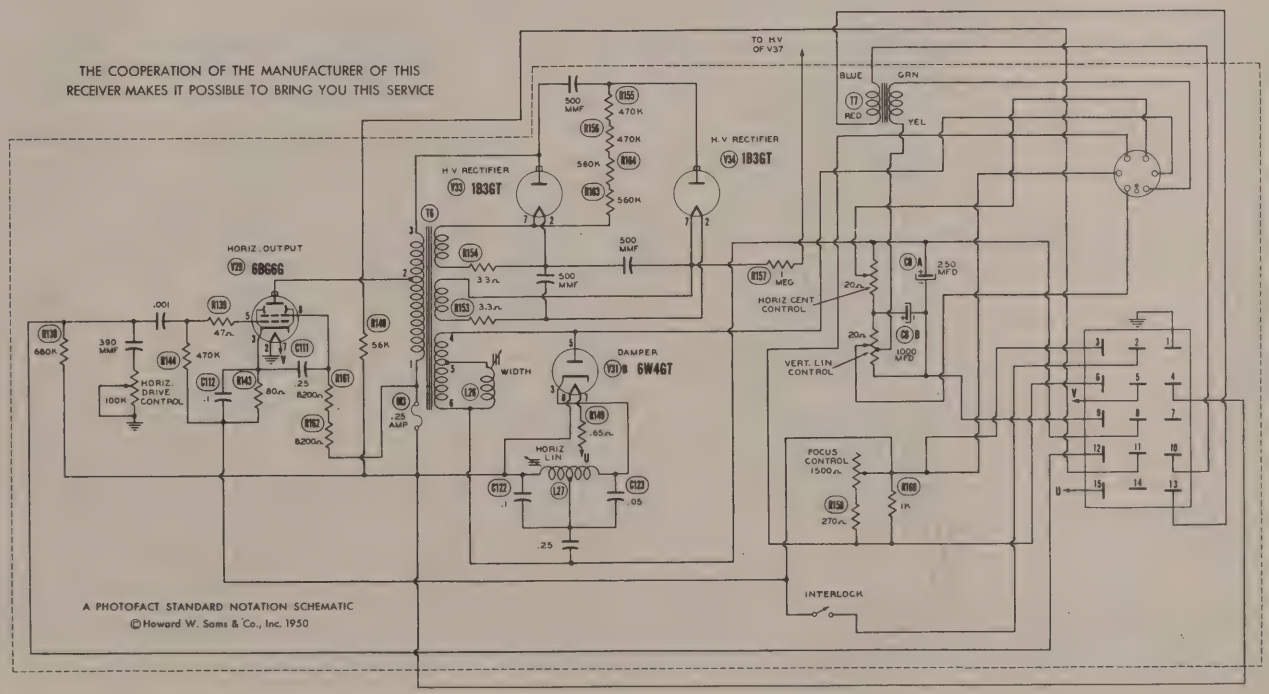

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HIGH VOLTAGE SUPPLY USED IN CHASSIS C-265&266

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	125VDC	125VDC	6.3VAC	0V.	-.1VDC	-.1VDC	0V.		
V 2	6J6	120VDC	120VDC	6.3VAC	0V.	-2.7VDC	-2VDC	0V.		
V 3	6J6	70VDC	70VDC	6.3VAC	0V.	§-3.4VDC	§-3.2VDC	.2VDC		
V 4	6AG5	-2VDC	.2VDC	6.3VAC	0V.	92VDC	92VDC	.2VDC		
V 5	6AG5	-.5VDC	.2VDC	6.3VAC	0V.	97VDC	97VDC	.2VDC		
V 6	6AG5	-.6VDC	.2VDC	6.3VAC	0V.	85VDC	100VDC	.2VDC		
V 7	6AG5	[illegible]V.	1VDC	6.3VAC	0V.	85VDC	105VDC	1VDC		
V 8	6AL5	0V.	-95VDC	6.3VAC	0V.	-95VDC	0V.	-.3VDC		
V 9	6AU6	-.7VDC	0V.	6.3VAC	0V.	225VDC	110VDC	0V.		
V 10	6K6GT	0V.	0V.	87VDC	112VDC	-2VDC	-10VDC	6.3VAC	2.7VDC	
V 11	6AL5	-80VDC	-2.2VDC	0V.	6.3VAC	-.6VDC	0V.	-92VDC		
V 12	6AT6	-90VDC	-92VDC	6.3VAC	0V.	-95VDC	-90VDC	-.1VDC		
V 13	6BA6	0V.	0V.	6.3VAC	0V.	10[illegible]VDC	100VDC	1.1VDC		
V 14	6BA6	0V.	0V.	0V.	6.3VAC	100VDC	100VDC	1.2VDC		
V 15	6AU6	-.3VDC	0V.	6.3VAC	0V.	45VDC	45VDC	0V.		
V 16	6T8	-.4VDC	-.4VDC	0V.	0V.	6.3VAC	0V.	0V.	0V.	75VDC
V 17	6SQ7GT	0V.	-.4VDC	0V.	0V.	0V.	145VDC	5.7VAC	0V.	
V 18	6V6GT	0V.	0V.	315VDC	320VDC	0V.	0V.	5.7VAC	20VDC	
V 19	6V6GT	0V.	0V.	315VDC	320VDC	0V.	0V.	5.7VAC	20VDC	
V 20	5Y3GT	0V.	350VDC	0V.	350VAC	0V.	350VAC	0V.	350VDC	
V 21	6SK7	0V.	6.3VAC	0V.	-.7VDC	0V.	105VDC	0V.	205VDC	
V 22	6SH7	0V.	6.3VAC	0V.	-1.4VDC	0V.	112VDC	0V.	110VDC	
V 23	6SN7GT	¶-.2VDC	¶11VDC	¶0V.	-.9VDC	75VDC	0V.	0V.	6.3VAC	
V 24	6J5	0V.	6.3VAC	¶80VDC ¶320VDC	¶0V.	¶-3.4VDC	¶2.6VDC	0V.	¶0V.	
V 25	6K6GT	0V.	6.3VAC	¶290VDC	¶290VDC	¶0V.	¶27VDC ¶37VDC	0V.	¶27VDC ¶37VDC	
V 26	6AL5	-.7VDC	-5.4VDC	[illegible]V.	5.1VAC	-1.9VDC	0V.	-6.8VDC		
V 27	6AC7	0V.	6.3VAC	0V.	-1VDC	.1VDC	90VDC	0V.	200VDC	
V 28	6K6GT	0V.	6.3VAC	190VDC	215VDC	-30VDC	-20VDC	0V.	.2VDC	
V 29	6BG6G	0V.	0V.	17VDC	375VDC	0V.	37VDC	6.3VAC	295VDC	TOP CAP •
V 30	6BG6G	0V.	0V.	17VDC	0V.	0V.	295VDC	6.3VAC	295VDC	TOP CAP •
V31	5V4G	0V.	320VDC	200VDC	280VDC	0V.	280VDC	0V.	320VDC	
V32	6AS7G	205VDC	280VDC	280VDC	205VDC	280VDC	280VDC	315VDC	315VDC	
V33	1B3GT	• DO NOT MEASURE								
V34	1B3GT	• DO NOT MEASURE								
V35	5U4G	0V.	290VDC	0V.	380VAC	0V.	380VAC	0V.	290VDC	
V36	5U4G	0V.	290VDC	0V.	380VAC	0V.	380VAC	0V.	290VDC	
V37	12LP4	0V.	-75VDC	PIN 10 270VDC	PIN 11 0V.	PIN 12 6.3VAC				

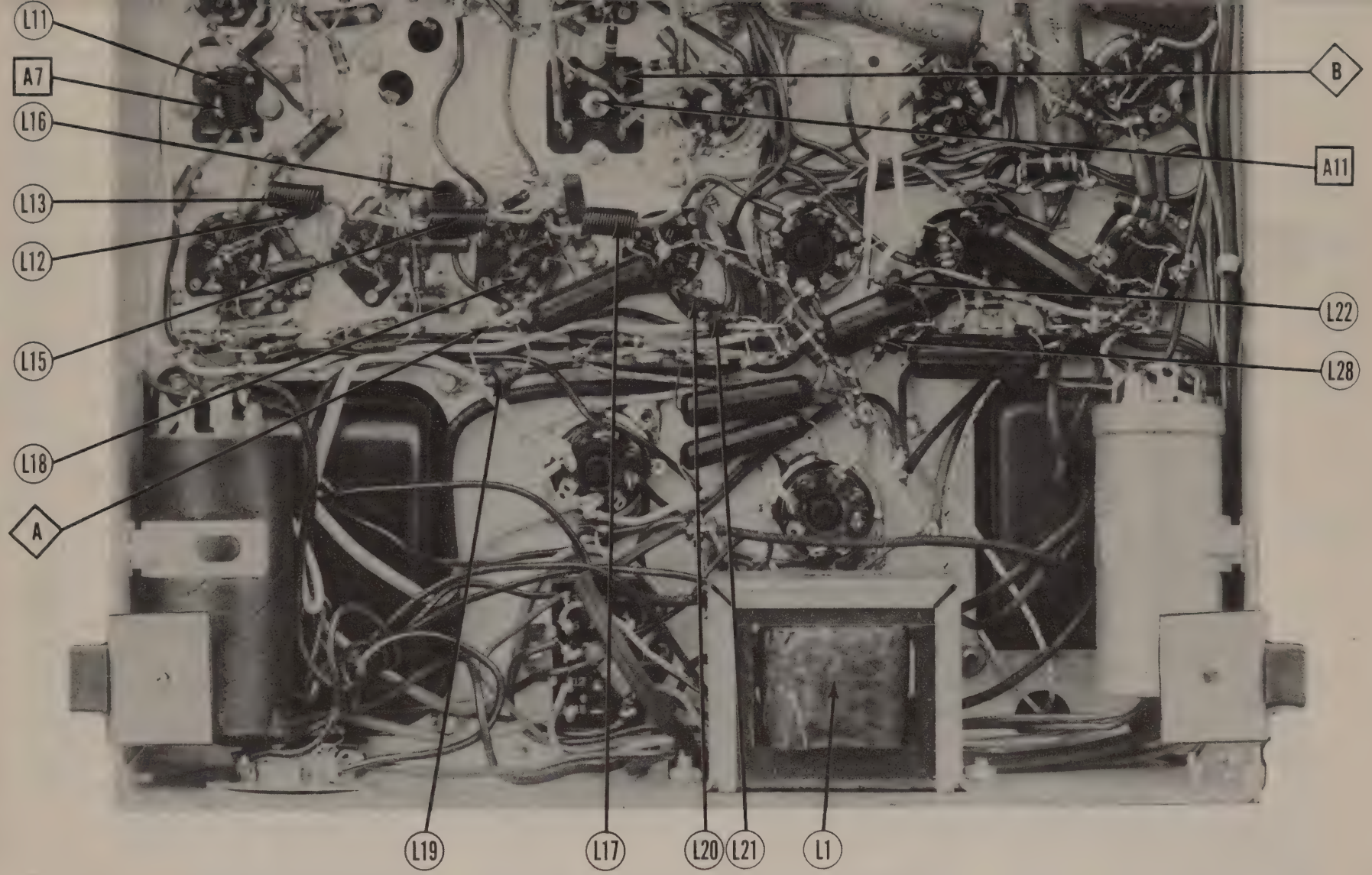
§ TAKEN WITH VACUUM TUBE VOLTMETER.
• DO NOT MEASURE.
¶ MEASURED FROM PIN 3 OF V23.
NOTE: CONTRAST CONTROL SET AT MAXIMUM FOR THESE MEASUREMENTS.

RESISTANCE READINGS

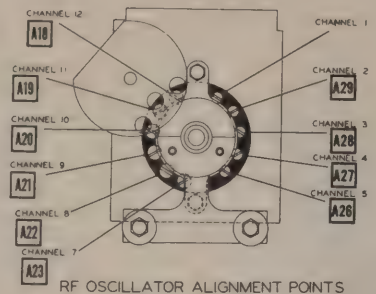
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	†5.5KΩ	†5.5KΩ	.1Ω	0Ω	70KΩ	†70KΩ	0Ω		
V 2	6J6	†3KΩ	†3KΩ	.1Ω	0Ω	1 Meg.	1 Meg.	0Ω		
V 3	6J6	†6.8KΩ	†6.8KΩ	.1Ω	0Ω	100KΩ	100KΩ	47Ω		
V 4	6AG5	320KΩ	39Ω	.1Ω	0Ω	†2.8KΩ	†2.6KΩ	39Ω		
V 5	6AG5	320KΩ	39Ω	.1Ω	0Ω	†2.6KΩ	†2.5KΩ	39Ω		
V 6	6AG5	320KΩ	39Ω	.1Ω	0Ω	†5KΩ	†2.2KΩ	39Ω		
V 7	6AG5	.1Ω	150Ω	.1Ω	0Ω	†7.5KΩ	†2.2KΩ	150Ω		
V 8	6AL5	.1Ω	¶10KΩ	.1Ω	0Ω	¶82KΩ	0Ω	4KΩ		
V 9	6AU6	470KΩ	0Ω	.1Ω	0Ω	†10KΩ	†1.2KΩ	0Ω		
V 10	[illegible]K6GT	Inf.	0Ω	†4.7KΩ	†1.2KΩ	500KΩ	65Ω	.1Ω	330Ω	
V 11	6AL5	1.2Meg.	47KΩ	0Ω	.1Ω	320KΩ	0Ω	200KΩ		
V 12	6AT6	¶650KΩ	¶330Ω	.1Ω	0Ω	¶82KΩ	¶82KΩ	†100KΩ		
V 13	6BA6	0Ω	0Ω	.1Ω	0Ω	†2.2KΩ	†2.2KΩ	100Ω		
V 14	6BA6	470KΩ	0Ω	0Ω	.1Ω	†2.2KΩ	†4.7KΩ	100Ω		
V 15	6AU6	22KΩ	0Ω	.1Ω	0Ω	†7KΩ	†7KΩ	0Ω		
V 16	6T8	100KΩ	100KΩ	200KΩ	0Ω	.1Ω	0Ω	0Ω	2 Meg.	†430KΩ
V 17	6SQ7GT	0Ω	10Meg.	0Ω	0Ω	0Ω	#220KΩ	.5Ω	0Ω	
V 18	6V6GT	0Ω	0Ω	#580Ω	#1.4KΩ	440KΩ	220KΩ	.5Ω	270Ω	
V 19	6V6GT	0Ω	0Ω	#580Ω	#1.4KΩ	440KΩ	220KΩ	.5Ω	270Ω	
V 20	5Y3GT	Inf.	200KΩ	Inf.	7KΩ	Inf.	69Ω	.5Ω	200KΩ	
V 21	6SK7	0Ω	.1Ω	0Ω	1Meg.	0Ω	†2.2KΩ	0Ω	†9.5KΩ	
V 22	6SH7	0Ω	.1Ω	0Ω	1 Meg.	0Ω	†1.2KΩ	0Ω	†8KΩ	
V 23	[illegible]SN7GT	¶220KΩ	▲680KΩ	¶0Ω	1 Meg.	†7KΩ	0Ω	0Ω	.1Ω	
V 24	6J5	0Ω	.1Ω	▲2.7Meg. ▲300KΩ	¶65KΩ	¶2.6 Meg.	¶100KΩ	0Ω	¶0Ω	
V 25	[illegible]K[illegible]GT	Inf.	.1Ω	†11KΩ	†11KΩ	¶2.2Meg.	¶15KΩ ¶10KΩ	0Ω	¶6.8KΩ ¶1.8KΩ	
V 26	6AL[illegible]	1 Meg.	1.5Meg.	0Ω	2Ω	12Ω	0Ω	1.5 Meg.		
V 27	6AC7	0Ω	.1Ω	0Ω	1.5Meg	10Ω	†18KΩ	0Ω	†23KΩ	
V 28	6K6GT	Inf.	.1Ω	†5KΩ	†10KΩ	80KΩ	50KΩ	0Ω	9Ω	
V 29	6BG6G	Inf.	0Ω	¶80Ω	†27Ω	¶470KΩ	▲9KΩ	.1Ω	▲9KΩ	TOP CAP ▲86Ω
V 30	6BG6G	Inf.	0Ω	¶80Ω	Inf.	¶470KΩ	¶200Ω	.1Ω	▲9KΩ	TOP CAP ▲86Ω
V31	5V4G	Inf.	700KΩ	†23KΩ	†30Ω	Inf.	†30Ω	Inf.	700KΩ	
V32	6AS7G	†1.1 Meg	†30Ω	†27Ω	†1.1Meg.	†30Ω	†27Ω	700KΩ	700KΩ	
V33	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ▲160Ω
V34	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP Inf.
V35	5U4G	Inf.	5.5KΩ	Inf.	♦1Ω	Inf.	♦10Ω	Inf.	5.5KΩ	
V36	5U4G	Inf.	5.5KΩ	Inf.	♦1Ω	Inf.	♦10Ω	Inf.	5.5KΩ	
V37	12LP4	0Ω	1.4Meg.	PIN 10 †68Ω	PIN 11 0Ω	PIN 12 .1Ω				

♦ MEASURED FROM CENTER-TAP OF T1.
† MEASURED FROM PIN 8 OF V35.
# MEASURED FROM PIN 2 OF V20.
▲ MEASURED FROM PIN 8 OF V31.
¶ MEASURED FROM PIN 3 OF V23.

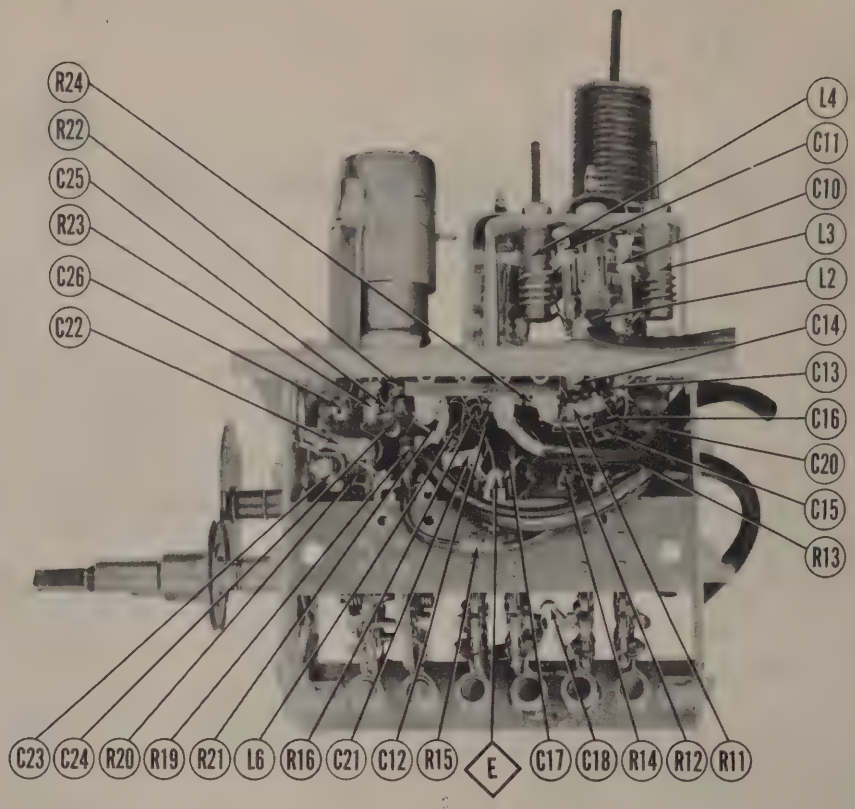
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



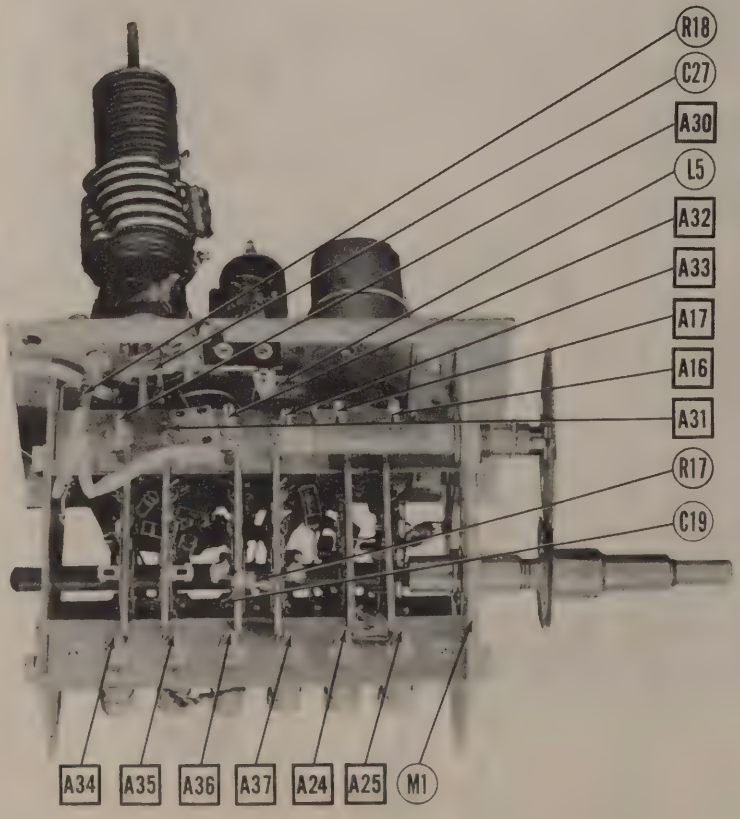
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



RF OSCILLATOR ALIGNMENT POINTS

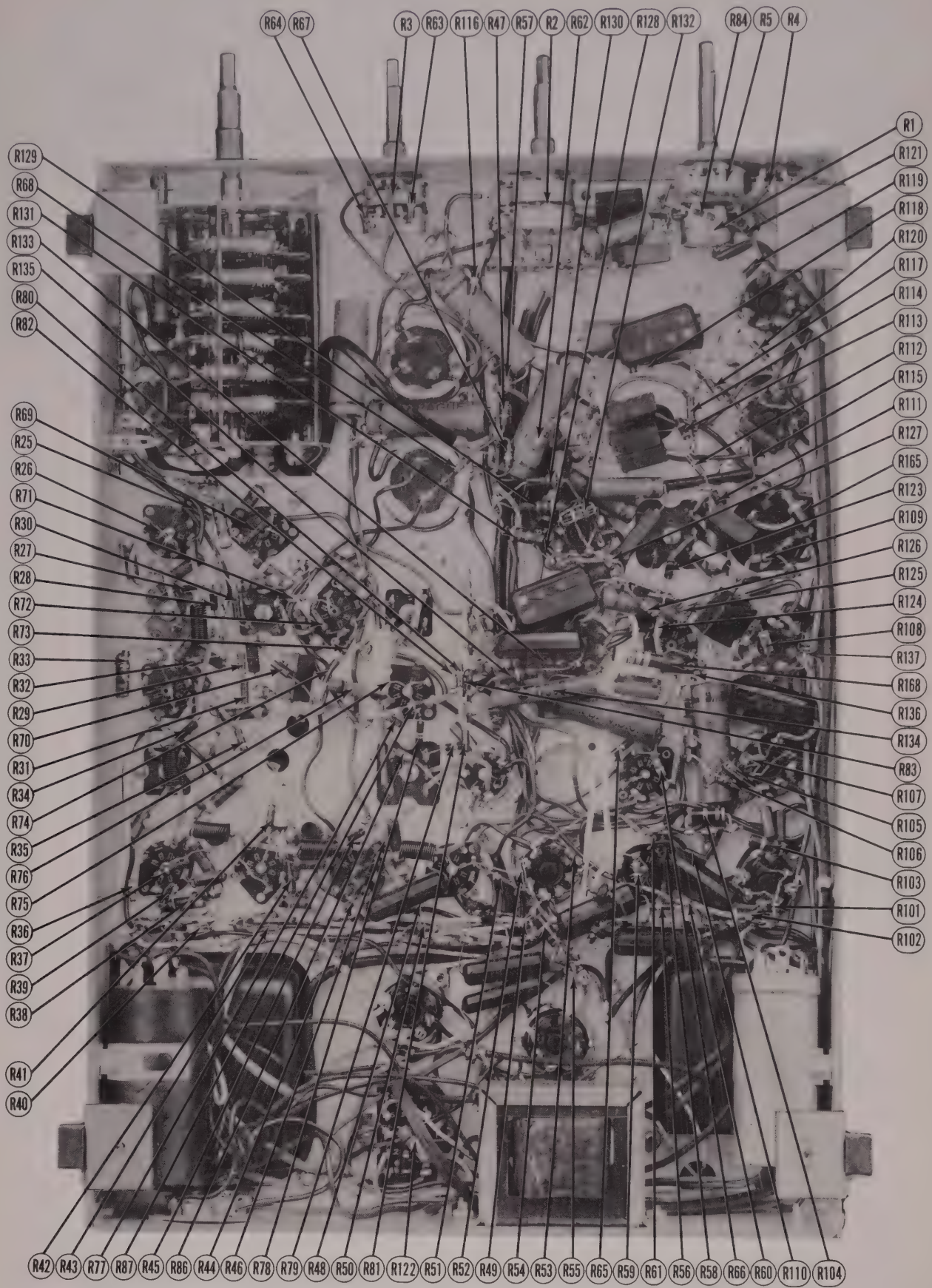


RF TUNER (NO. 13872)-RIGHT SIDE



RF TUNER (NO. 13872)- LEFT SIDE

CHASSIS BOTTOM VIEW–CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		CAPEHART PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6J6	6J6	7BF	
V2	Mixer	6J6	6J6	7BF	
V3	Oscillator	6J6	6J6	7BF	
V4	1st Video IF	6AG5	6AG5	7BD	
V5	2nd Video IF	6AG5	6AG5	7BD	
V6	3rd Video IF	6AG5	6AG5	7BD	
V7A	4th Video IF	6AG5	6AG5	7BD	
B	4th Video IF	6AH6	6AH6	7BK	
V8	Video Det.-AGC Rectifier	6AL5	6AL5	6BT	
V9	Video Amp.	6AU6	6AU6	7BK	
V10	Video Output	6K6GT	6K6GT	7S	
V11	DC Restorer-AGC Limiter	6AL5	6AL5	6BT	
V12	AGC Amp.	6AT6	6AT6	7BT	
V13	1st Sound IF	6BA6	6BA6	7BK	
V14	2nd Sound IF	6BA6	6BA6	7BK	
V15	Limiter	6AU6	6AU6	7BK	
V16	Disc.-AF Amp.	6T8	6T8	9E	
V17	Phase Inv.	6SQ7GT	6SQ7GT	8Q	
V18A	Audio Output	6V6GT	6V6GT	7AC	Chassis A-13
B	Audio Output	6K6GT	6K6GT	7S	Chassis C-267
V19	Audio Output	6V6GT	6V6GT	7AC	
V20	LV Rectifier	5Y3GT	5Y3GT	5T	
V21	1st Sync. Amp.	6SK7	6SK7	8N	
V22	Sync. Sep.	6SH7	6SH7	8BK	
V23	2nd Sync. Amp.-Hor. Disch.	6SN7GT	6SN7GT	8BD	
V24	Vert. Osc. & Disch.	6J5	6J5	6Q	
V25A	Vert. Output	6K6GT	6K6GT	7S	Chassis U-12, U-12A
B	Vert. Output	6V6GT	6V6GT	7AC	Chassis C-267
V26	Hor. Sync. Disc.	6AL5	6AL5	6BT	
V27	Hor. AFC	6AC7	6AC7	8N	
V28	Hor. Osc.	6K6GT	6K6GT	7S	
V29	Hor. Output	6BG6G	6BG6G	5BT	
V30	Hor. Output	6BG6G	6BG6G	5BT	Chassis C-271, C-255
V31A	Damper	5V4G	5V4G	5L	Chassis C-271, C-255
B	Damper	6W4GT	6W4GT	4CG	Chassis C-265, C-266
V32	Damper	6AS7G	6AS7G	8BD	
V33	HV Rectifier	1B3GT	1B3GT	3C	
V34	HV Rectifier	1B3GT	1B3GT	3C	
V35	LV Rectifier	5U4G	5U4G	5T	
V36	LV Rectifier	5U4G	5U4G	5T	
V37A	Picture Tube	125	12LP4	12D	
B	Picture Tube	10FP4	10FP4	12D	
C	Picture Tube	100	10BP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	CAPEHART PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	40	450	25467	AFH882J	UP9CJ897		TVL-30	● Filter
B	40	450						■ Filter
C	10	450						▲ Vert. Output Decoupling
C2A	40	450	25466	AFH82J16D	UP9CJ915		TVL-25	● Filter
B	10	450						■ Vert. Osc. Decoupling
C	80	200						▲ Filter
C3A	80	450	25468	AFH16J10B	UP9BJ730		TVL-18	● Filter
B	50	50						▲ Vert. Output Decoupling
C4A	40	450	25469	AFH82J2H	UP9CJ731		TVL-53	● Filter
B	10	450						■ Decoupling
C	10	350						▲ Low Pass Filter
C5A	20	450	25470	AFH4J16H	UP9BJ337		TVL-16	● AF Plate Decoupling
B	80	350						▲ Filter
C6A	30	450	25424	AF644J	UP32245		EL-420 ♦	● Filter
B	20	450						■ Filter
C	20	450						▲ Filter
C7	25	25	25128	PRS25/25	BR252A		TVA-6	Output Cathode Bypass
C8A	250	10	25471	PRS12/250	UP7BJ808		TVL-66	● Hor. Cent. Cont. Bypass
B	1000	6		PRS6/1000				▲ Vert. Cent. Cont. Bypass
C9	10	450		PRS450/10	BR1045		TVA-21	Output Decoupling *
C10	10					NPOK-10		Fixed Trimmer
C11	10					NPOK-10		Fixed Trimmer
C12	1500					GP2L-0015		AGC Filter
C13	270					GP2K-270		RF Coupling
C14	270					GP2K-270		RF Coupling
C15	1.5					NPOK-1.5		Neutralizing
C16	1.5					NPOK-1.5		Neutralizing
C17	.68							RF Coupling
C18	4.7					NPOK-4.7		RF Coupling
C19	2.2							RF Coupling
C20	1500					GP2L-0015		RF Decoupling
C21	22							Fixed Trimmer
C22	1500					GP2L-0015		Osc. Decoupling
C23	10					NPOK-10		Fixed Trimmer
C24	4.7					NPOK-4.7		Osc. Feedback
C25	4.7					NPOK-4.7		Osc. Feedback
C26	1500					GP2L-0015		Filament Bypass
C27	1500					GP2L-0015		Mixer Decoupling
C28	68	300						Fixed Trimmer
C29	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C30	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C31	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C32	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Decoupling
C33	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Fil. Bypass
C34	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C35	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C36	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C37	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C38	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Decoupling

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA CAPEHART PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C39	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Fil ament Bypass
C40	43							Fixed Trimmer
C41	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C42	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C43	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C44	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C45	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Fil. Bypass
C46	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C47	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C48	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Decoupling
C49	82		25476	1468-0001	5W5T1	GP1K-100	1FM-31	4th V. IF Cath. Bypass
C50	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C51	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Fil. Bypass
C52	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	V. Det. Fil. Bypass
C53	.05	600	25482-1	P688-05	GT6S5		TM-15	Video Coupling
C54	10		25479	1468-00001	5W5Q1	GP1K-10	MS-41	V. Diode Filter
C55	.05	600	25482-1	P688-05	GT6S5		TM-15	Video Coupling
C56	.05	600	25482-1	P688-05	GT6S5		TM-15	Video Coupling
C57	.05	600	25482-1	P688-05	GT6S5		TM-15	Video Coupling
C58	.25	200	25480-1	P488-25	GT2P25		TC-2	DC Res. Diode Dec.
C59	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C60	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C61	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C62	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C63	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C64	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C65	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Cath. Bypass
C66	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Decoupling
C67	.01	600	25482-4	P688-01	GT6S1	GP2-335-01	TM-11	2nd S. IF Grid Filter
C68	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Cath. Bypass
C69	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Screen Bypass
C70	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Plate Decoupling
C71	51		25477	1468-.00005	5W5Q5	GP1K-50	1FM-45	Limiter Grid Filter
C72	5000		25473	1467-005	1D5D5	GP2M-005	1FM-25	Limiter Decoupling
C73	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	RF Bypass
C74	.002	600	25482-9	P688-002	GT6D2	GP2M-002	TM-22	Tone Compensation
C75	.003	600	25482-7	P688-003	GT6D3	GP2M-003	TM-23	Tone Compensation
C76	.02	400	25480-15	P488-02	GT4S2		TM-12	Audio Coupling
C77	.01	600	25482-4	P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C78	.05	200	25482-1	P288-05	GT2S5		TM-15	Bias Filter †
C79	500		25474	1468-0005	5W5T5	GP2K-500	1FM-35	AF Plate Bypass
C80	.005	600	25482-5	P688-005	GT6D5	GP2M-005	TM-25	Audio Coupling
C81	.01	600	25194	P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling †
C82	.02	600	25195	P688-02	GT6S2		TM-12	Audio Coupling †
C83	.003	600	25184	P688-003	GT6D3	GP2M-003	TM-23	Output Plate Bypass †
C84	.003	600	25184	P688-003	GT6D3	GP2M-003	TM-23	Output Plate Bypass †
C85	.05	600	25482-2	P688-05	GT6S5		TM-15	Sync. Coupling
C86	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	1st Sync. Amp. Plate Bypass
C87	.1	600	25480-2	P688-1	GT6P1		TM-1	1st Sync. Amp. Plate Decoupling
C88	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	Sync. Coupling
C89	.05	600	25482-2	P688-05	GT6S5		TM-15	Sync. Coupling
C90	.01	600	25482-4	P688-01	GT6S1	GP2-335-01	TM-11	Vert. Sync. Coupling
C91	.002	600	25482-9	P688-002	GT6D2	GP2M-002	TM-22	Integrator Net.
C92	.005	600	25482-5	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C93	.005	600	25482-5	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C94	4700	500	25472	1467-005	1D5D5	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C95	.05	600	25482-2	P688-05	GT6S5		TM-15	Vert. Discharge
C96	.1	600	25480-2	P688-1	GT6P1		TM-1	Vert. Sweep Coupling
C97	82		25476					Hor. Sync. Coupling
C98	.015	400	25480-5	P488-015	GT6S15			Fixed Trimmer
C99	.004	600	25480-8	P688-004	GT6D4		TM-24	AFC Filter
C100	.05	600	25482-1	P688-05	GT6S5		TM-15	AFC Filter
C101	.05	600	25482-1	P688-05	GT6S5		TM-15	AFC Filter
C102	.004	600	25480-8	P688-004	GT6D4		TM-24	AFC Coupling
C103	.015	400	25480-5	P488-015	GT6S15			Phase Shifter
C104	1200		25454-2					Phase Shifter
C105	.004	600	25480-8	P688-004	GT6D4		TM-24	Hor. Osc. Grid Cap.
C106	.05	600	25482-1	P688-05	GT6S5		TM-15	Hor. Osc. Screen Bypass
C107	390	500	25446	1468-0004	5W5T4	GP2K-390	1FM-34	Differentiator Net.
C108	.01	600	25482-4	P688-01	GT6S1	GP2-335-01	TM-11	Hor. Sweep Coupling
C109	680	500	25503		2R5T7	GP2K-680	MS-37	Hor. Discharge #
C110	.001	600	25482-3	P688-001	GT6D1	GP2L-001	TM-21	Hor. Sweep Coupling
C111	.25	600	25480-14	P688-25	GT6P25		TC-2	Hor. Output Screen Bypass
C112	.1	200	25480-12	P288-1	GT2P1		TM-1	Hor. Output Cath. Bypass
C113	150	1200	25508-1	1456-00015				Fixed Trimmer
C114	150	1200	25508-1	1456-00015				Hor. Sweep Coupling
C115	.25	600	25480-14	P688-25	GT6P25		TC-2	Damper Filter
C116	.01	600	25482-4	P688-01	GT6S1	GP2-335-01	TM-11	Hor. Sweep Coupling
C117	500	15000	25498			410-500		Voltage Doubler Cap.
C118	500	15000	25498			410-500		HV Filter
C119	500	15000	25498			410-500		HV Filter
C120	.01	600	25209	P688-01	GT6S1	GP2-335-01	TM-11	Line Filter
C121	.01	600	25209	P688-01	GT6S1	GP2-335-01	TM-11	Line Filter
C122	.1	600		P688-1	GT6P1		TM-1	Damper Filter §
C123	.05	600		P688-05	GT6S5		TM-15	Damper Filter §
C124	.003	600	25184	P688-003	GT6D3	GP2M-003	TM-23	Output Plate Bypass *
C125	33		25478	1468-00004	5W5Q4	GP1K-33	1FM-44	IF Coupling

* Used only in model 462P12.
† Used only in chassis U12 and C-267.
‡ Used only in chassis U12 and U12A.
§ Used only in chassis C265 and C266.
# Chassis C265 and C266 use 390MMF in this application.
♦ Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1000Ω			B11-108 *		Contrast control, rear
B	50KΩ		78161	B11-123 *		Brightness control, panel
C	Shaft End			E202 *		Attach per instructions in "Concentrikit".

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.	CLA PA
R2A	1 Meg.			B11-137 *	
B	50KΩ		78160	B11-123 *	
C	Shaft End			E202 *	
R3A	3 Meg.		78164		
B	3 Meg.				
R4A	5000Ω		78163	Q11-114	AM
B	Shaft		Not Req.	RQ	KSS
R5A	2.5 Meg.		78162	Q11-239	AM
B	Shaft		Not Req.	RQ	KSS
R6	20KΩ		78167	Q11-119	M-2
R6	100KΩ				
R7	100KΩ		78163	Q11-128	M-4
R8	20Ω	2	78166-1	W-20X10	43-
R9	20Ω	2	78166-2	W-20	43-
R10	1500Ω	4	78165		10-

* Additional parts to be used with "Concentrikit".
Note 1. Used only in HV power supply chassis C265 and
Note 2. Not used in HV power supply chassis C265 and

RE

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	IRC PART No.
R11	150Ω			
R12	150Ω			
R13	4700Ω 20%			
R14	4700Ω 20%			
R15	1000Ω 20%			BTS-1000
R16	1 Meg. 20%			
R17	10KΩ			
R18	1000Ω 20%			BTS-1000
R19	150Ω			
R20	4700Ω 20%			BTS-4700
R21	47Ω 20%			
R22	100KΩ 20%			
R23	100KΩ 20%			
R24	1000Ω 20%			BTS-1000
R25	10KΩ 5%		77212	
R26	39Ω		77478	
R27	1000Ω 20%		77233	BTS-1000
R28	150Ω		77188	
R29	150Ω		77188	
R30	1000Ω 20%		77233	BTS-1000
R31	1000Ω 20%		77233	BTS-1000
R32	10KΩ 5%		77212	
R33	39Ω		77478	
R34	1000Ω 20%		77233	BTS-1000
R35	150Ω		77188	
R36	4700Ω 5%		77211	BTS-4700-5
R37	39Ω		77478	
R38	2700Ω 5%		77420	BTS-2700-5
R39	1000Ω 20%		77233	BTS-1000
R40	150Ω		77188	
R41	150Ω		77188	
R42	5600Ω 5%		77474	
R43	1000Ω 20%		77233	BTS-1000
R44	3900Ω 5%		77475	BTS-3900-5
R45	10KΩ 5%		77212	BTS-10K-5%
R46	82KΩ		77468	BTS-82K
R47	68KΩ		77068	BTS-68K
R48	470KΩ		77204	BTS-470K
R49	3300Ω		77195	BTS-3300
R50	6800Ω		77148	BTS-6800
R51	820KΩ 5%		77466	BTS-820K-
R52	1.2 Meg. 5%		77465	BTS-1.2 Me
R53	330Ω		77191	
R54	3300Ω	1	77476	BTA-3300
R55	10KΩ		77212	BTS-10K
R56	100KΩ		77201	BTS-100K
R57	150KΩ		77252	BTS-150K
R58	1 Meg.		77205	BTS-1 Meg
R59	47KΩ		77200	BTS-47K
R60	270KΩ		77327	BTS-270K
R61	47KΩ		77200	BTS-47K
R62	220KΩ		77202	BTS-220K
R63	22KΩ		77198	BTS-22K
R64	330Ω		77191	BW-½-330
R65	100KΩ		77201	BTS-100K
R66	470KΩ		77204	BTS-470K
R67	27KΩ		77410	BTS-27K
R68	2.7 Meg.		77396	BTS-2.7 M
R69	100Ω 20%		77176	
R70	1000Ω 20%		77233	BTS-1000
R71	470KΩ		77204	BTS-470K
R72	100Ω 20%		77176	
R73	3300Ω		77195	BTS-3300
R74	1000Ω 20%		77233	BTS-1000
R75	22KΩ		77198	
R76	10KΩ	1	77022	BTA-10K
R77	10KΩ		77212	BTS-10K
R78	100KΩ		77201	BTS-100K
R79	100KΩ		77201	BTS-100K
R80	22KΩ		77198	BTS-22K
R81	1.5 Meg.		77464	BTS-1.5 M
R82	470KΩ		77204	BTS-470K
R83	470KΩ		77204	BTS-470K
R84	220KΩ 20%		77202	BTS-220K
R85	4.7 Meg.		77253	BTS-4.7 M
R86	330KΩ		77222	BTS-330K
R87	100KΩ		77201	BTS-100K
R88	10 Meg. 20%		77182	BTS-10 M
R89	220KΩ 20%		77178	BTS-220K
R90	270Ω	2	77495	BW-2-270

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP	RATING VOLT	CAPEHART PART No.	REPLACEMENT DATA AEROVOX PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C38	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Fil ament Bypass
C40	Kit							Fixed Trimmer
C41	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C42	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C43	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C44	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C45	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Fil. Bypass
C46	270		25475	1468-00025	5W5T25	GP2K-270	1FM 325	IF Coupling
C47	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C48	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Decoupling
C49	82		25476	1468-0001	5W5T1	GP1K-100	1FM-31	4th V. IF Cath. Bypass
C50	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C51	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Fil. Bypass
C52	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	V. Det. Fil. Bypass
C53	.05	600	25482-1	P488-05	GT6S5		TM-15	Video Coupling
C54	10		25479	1468-00001	5W5Q1	GP1K-10	MS-41	V. Diode Filter
C55	.05	600	25482-1	P488-05	GT6S5		TM-15	Video Coupling
C56	.05	600	25482-1	P488-05	GT6S5		TM-15	Video Coupling
C57	.05	600	25482-1	P488-05	GT6S5		TM-15	Video Coupling
C58	.25	200	25480-1	P488-25	GT2P25		TC-2	DC Res. Diode Dec.
C59	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C60	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C61	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C62	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C63	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C64	.25	200	25480-1	P488-25	GT2P25		TC-2	AGC Filter
C65	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Cath. Bypass
C66	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Decoupling
C67	.01	600	25483-4	P488-01	GT6S1	GP2-335-01	TM-11	2nd S. IF Grid Filter
C68	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Cath. Bypass
C69	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Screen Bypass
C70	1500		25273	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Plate Decoupling
C71	51		25477	1468-.00005	5W5Q5	GP1K-50	1FM-45	Limiter Grid Filter
C72	5000		25473	1467-005	1D5D5	GP2M-005	1FM-35	Limiter Decoupling
C73	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	RF Bypass
C74	.002	600	25483-9	P488-002	GT6D2	GP2M-002	TM-22	Tone Compensation
C75	.003	600	25483-7	P488-003	GT6D3	GP2M-003	TM-23	Tone Compensation
C76	.03	400	25480-15	P488-03	GT4S2		TM-12	Audio Coupling
C77	.01	600	25483-4	P488-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C78	.05	200	25482-1	P288-05	GT2S5		TM-15	Bias Filter †
C79	500		25474	1468-0005	5W5T5	GP2K-500	1FM-35	AF Plate Bypass
C80	.005	600	25482-5	P488-005	GT6D5	GP2M-005	TM-25	Audio Coupling
C81	.01	600	25194	P488-01	GT6S1	GP2-335-01	TM-11	Audio Coupling †
C82	.02	600	25195	P488-02	GT6S2		TM-12	Audio Coupling †
C83	.003	600	25184	P488-003	GT6D3	GP2M-003	TM-23	Output Plate Bypass †
C84	.003	600	25184	P488-003	GT6D3	GP2M-003	TM-23	Output Plate Bypass †
C85	.05	600	25482-2	P488-05	GT6S5		TM-15	Sync. Coupling
C86	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	1st Sync. Amp. Plate Bypass
C87	.1	600	25480-2	P488-1	GT6P1		TM-1	1st Sync. Amp. Plate Decoupling
C88	270		25475	1468-00025	5W5T25	GP2K-270	1FM-325	Sync. Coupling
C89	.05	600	25482-2	P488-05	GT6S5		TM-15	Sync. Coupling
C90	.01	600	25483-4	P488-01	GT6S1	GP2-335-01	TM-11	Vert. Sync. Coupling
C91	.002	600	25483-9	P488-002	GT6D2	GP2M-002	TM-22	Integrator Net.
C92	.005	600	25482-5	P488-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C93	.005	600	25482-5	P488-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C94	4700	500	25472	1467-005	1D5D5	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C95	.05	600	25482-2	P488-05	GT6S5		TM-15	Vert. Discharge
C96	.1	600	25480-2	P488-1	GT6P1		TM-1	Vert. Sweep Coupling
C97	82		25476					Hor. Sync. Coupling
C98	.015	400	25480-5	P488-015	GT6S15			Fixed Trimmer
C99	.004	600	25480-8	P488-004	GT6D4		TM-24	AFC Filter
C100	.05	600	25482-1	P488-05	GT6S5		TM-15	AFC Filter
C101	.05	600	25482-1	P488-05	GT6S5		TM-15	AFC Filter
C102	.004	600	25480-8	P488-004	GT6D4		TM-24	AFC Coupling
C103	.015	400	25480-5	P488-015	GT6S15			Phase Shifter
C104	1200		25454-2					Phase Shifter
C105	.004	600	25480-8	P488-004	GT6D4		TM-24	Hor. Osc. Grid Cap.
C106	.05	600	25482-1	P488-05	GT6S5		TM-15	Hor. Osc. Screen Bypass
C107	390	500	25446	1468-0004	5W5T4	GP2K-390	1FM-34	Differentiator Net.
C108	.01	600	25482-4	P488-01	GT6S1	GP2-335-01	TM-11	Hor. Sweep Coupling
C109	680	500	25503		ZR5T7	GP2K-680	MS-37	Hor. Discharge †
C110	.001	600	25482-3	P488-001	GT6D1	GP2L-001	TM-21	Hor. Sweep Coupling
C111	.25	600	25480-14	P488-25	GT6P25		TC-2	Hor. Output Screen Bypass
C112	.1	300	25480-12	P288-1	GT2P1		TM-1	Hor. Output Cath. Bypass
C113	150	1200	25508-1	1456-00015				Fixed Trimmer
C114	150	1200	25508-1	1456-00015				Hor. Sweep Coupling
C115	.25	600	25480-14	P488-25	GT6P25		TC-2	Damper Filter
C116	.01	600	25482-4	P488-01	GT6S1	GP2-335-01	TM-11	Hor. Sweep Coupling
C117	500	15000	25498			410-500		Voltage Doubler Cap.
C118	500	15000	25498			410-500		HV Filter
C119	500	15000	25498			410-500		HV Filter
C120	.01	600	25309	P488-01	GT6S1	GP2-335-01	TM-11	Line Filter
C121	.01	600	25309	P488-01	GT6S1	GP2-335-01	TM-11	Line Filter
C122	.1	600		P488-1	GT6P1		TM-1	Damper Filter §
C123	.05	600		P488-05	GT6S5		TM-15	Damper Filter §
C124	.003	600	25184	P488-003	GT6D3	GP2M-003	TM-23	Output Plate Bypass *
C125	33		25478	1468-00004	5W5Q4	GP1K-33	1FM-44	IF Coupling

* Used only in model 462P12.
† Used only in chassis U12 and C-267.
‡ Used only in chassis U12 and U12A.
§ Used only in chassis C265 and C266.
♦ Chassis C265 and C266 use 390MMF in this application.
♦ Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA IRC PART No.	REPLACEMENT DATA CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1000Ω	½	78161	B11-108 *		Contrast control, rear
B	50KΩ	½		B11-123 *		Brightness control, panel
C	Shaft End			E202 *		Attach per instructions in "Concentrikit".

CONTROLS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA IRC PART No.	REPLACEMENT DATA CLAROSTAT PART No.	INSTALLATION NOTES
R2A	1 Meg.	½	78160	B11-137 *		Vert. hold control, rear
B	50KΩ	½		B11-123 *		Horiz. hold control, panel
C	Shaft End			E202 *		Attach per instructions in "Concentrikit".
R3A	3 Meg.	½	78164			Volume control and switch, tapped at 1.5 Meg.
B	3 Meg.	½				Tone control
R4A	500Ω	½	78163	QII-114	AM-19-S	Vert. linearity control
B	Shaft		Not Req.	RQ	KSS-3 #	Attach to R4A per instructions
R5A	2.5 Meg.	½	78162	QII-239	AM-84-S	Height control
B	Shaft		Not Req.	RQ	KSS-3 #	Attach to R5A per instructions
R6	20KΩ	½	78167	QII-119	M-36-S	Horiz. drive control
R6	100KΩ	½				Horiz. drive control See note 1
R7	100KΩ	½	78163	QII-128	M-49-S	Horiz. linearity control See note 2
R8	20Ω	2	78166-1	W-20X10	43-20CT	Vert. centering control tapped at 10Ω
R9	20Ω	2	78166-2	W-20	43-20	Horiz. centering control, Wire Wound
R10	1500Ω	4	78165		10-1500	Focus control, Wire Wound

* Additional parts to be used with "Concentrikit".
Note 1. Used only in HV power supply chassis C265 and C266.
Note 2. Not used in HV power supply chassis C265 and C266.

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R11	150Ω	1			RF Grid
R12	150Ω	1			RF Grid
R13	4700Ω 20%	1			RF Plate
R14	4700Ω 20%	1			RF Plate
R15	1000Ω 20%	1		BTS-1000	RF Plate Decoupling
R16	1 Meg. 20%	1			Mixer Grid
R17	10KΩ	1			Mixer Grid Shunt
R18	1000Ω 20%	1		BTS-1000	Mixer Plate Decoupling
R19	150Ω	1			Decoupling Network
R20	4700Ω 20%	1		BTS-4700	Osc. Plate
R21	47Ω 20%	1			Osc. Cathode
R22	100KΩ 20%	1			Osc. Grid
R23	100KΩ 20%	1			Osc. Grid
R24	1000Ω 20%	1		BTS-1000	AGC Network
R25	10KΩ 5%	1	77212		1st Video IF Grid
R26	39Ω	1	77478		1st Video IF Cathode
R27	1000Ω 20%	1	77233	BTS-1000	1st Video IF Decoupling
R28	150Ω	1	77188		Decoupling Network
R29	150Ω	1	77188		Decoupling Network
R30	1000Ω 20%	1	77233	BTS-1000	AGC Network
R31	1000Ω 20%	1	77233	BTS-1000	AGC Network
R32	10KΩ 5%	1	77212		2nd Video IF Grid
R33	39Ω	1	77478		2nd Video IF Cathode
R34	1000Ω 20%	1	77233	BTS-1000	2nd Video IF Decoupling
R35	150Ω	1	77188		Decoupling Network
R36	4700Ω 5%	1	77211	BTS-4700-5%	3rd Video IF Grid
R37	39Ω	1	77478		3rd Video IF Cathode
R38	2700Ω 5%	1	77420	BTS-2700-5%	3rd Video IF Plate
R39	1000Ω 20%	1	77233	BTS-1000	3rd Video IF Decoupling
R40	150Ω	1	77188		Decoupling Network
R41	150Ω	1	77188		4th Video IF Cathode
R42	5600Ω 5%	1	77474		4th Video IF Plate
R43	1000Ω 20%	1	77233	BTS-1000	4th Video IF Decoupling
R44	3900Ω 5%	1	77475	BTS-3900-5%	Video Det. Diode Load
R45	10KΩ 5%	1	77212	BTS-10K-5%	AGC Rect. Plate
R46	82KΩ	1	77468	BTS-82K	AGC Rect. Cathode
R47	68KΩ	1	77068	BTS-68K	AGC Network
R48	470KΩ	1	77204	BTS-470K	Video Amp. Grid
R49	3300Ω	1	77195	BTS-3300	Video Amp. Plate
R50	680Ω	1	77148	BTS-680Ω	Video Amp. Plate Decoupling
R51	820KΩ 5%	1	77466	BTS-820K-5%	Video Output Grid
R52	1.2 Meg. 5%	1	77465	BTS-1.2 Meg. 5%	Bias Network
R53	330Ω	1	77191		Video Output Cathode
R54	3300Ω	1	77476	BTA-3300	Video Output Plate
R55	10KΩ	2	77212	BTS-10K	Isolation
R56	100KΩ	2	77201	BTS-100K	Picture Tube Grid
R57	150KΩ	2	77252	BTS-150K	Voltage Divider
R58	1 Meg.	2	77205	BTS-1 Meg.	Voltage Divider
R59	47KΩ	2	77200	BTS-47K	DC Rest. Load
R60	270KΩ	2	77327	BTS-270K	Voltage Divider
R61	47KΩ	2	77200	BTS-47K	Voltage Divider
R62	220KΩ	2	77202	BTS-220K	AGC Filter Network
R63	22KΩ	2	77198	BTS-22K	AGC Amp. Cathode
R64	330Ω	2	77191	BW-½-330	Bias Network
R65	100KΩ	2	77201	BTS-100K	AGC Network
R66	470KΩ	2	77204	BTS-470K	AGC Network
R67	27KΩ	2	77410	BTS-27K	AGC Amp. Plate
R68	2.7 Meg.	2	77396	BTS-2.7 Meg.	Voltage Divider
R69	100Ω 20%	2	77176		1st Sound IF Cathode
R70	1000Ω 20%	2	77233	BTS-1000	1st Sound IF Decoupling
R71	470KΩ	2	77204	BTS-470K	2nd Sound IF Grid
R72	100Ω 20%	2	77176		2nd Sound IF Cathode
R73	3300Ω	2	77195	BTS-3300	2nd Sound IF Screen
R74	1000Ω 20%	2	77233	BTS-1000	2nd Sound IF Plate Decoupling
R75	22KΩ	2	77198		Limiter Grid
R76	10KΩ	2	77022	BTA-10K	Limiter Decoupling
R77	10KΩ	2	77212	BTS-10K	Voltage Divider
R78	100KΩ	2	77201	BTS-100K	Disc. Diode Load
R79	100KΩ	2	77201	BTS-100K	Disc. Diode Load
R80	22KΩ	2	77198	BTS-22K	De-emphasis
R81	1.5 Meg.	2	77464	BTS-1.5 Meg.	AF Grid
R82	470KΩ	2	77204	BTS-470K	AF Grid See Note 3
R83	470KΩ	2	77204	BTS-470K	Bias Network See Note 3
R84	220KΩ 20%	2	77202	BTS-220K	Tone Compensation
R85	4.7 Meg.	2	77253	BTS-4.7 Meg.	Bias Network See Note 4
R86	330KΩ	2	77222	BTS-330K	AF Plate
R87	100KΩ	2	77201	BTS-100K	AF Plate Decoupling See Note 3
R88	10 Meg. 20%	2	77182	BTS-10 Meg.	Phase Inv. Grid See Note 5
R89	220KΩ 20%	2	77178	BTS-220K	Phase Inv. Plate See Note 5
R90	270Ω	2	77495	BW-2-270	Output Cathode See Note 5

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
R91	220KΩ 20%	1	77178	BTS-220K	Output Grid See Note 5
R92	220KΩ 20%	1	77178	BTS-220K	Output Grid See Note 5
R93	220KΩ 20%	1	77178	BTS-220K	Output Grid See Note 5
R94	470Ω	1	77170	BTS-470	Filter See Note 5
R95A	1000Ω	5	77463	AB-1000	Filter-Wire Wound See Note 5
B	400Ω	5			Surge Limiter-Wire Wound See Note 5
R96	1Ω	5	77510	AB-1	Filament Dropping See Note 5 and 6
R97	15Ω	1	77491	BW-½-15	Bias Network See Note 5
R98	270KΩ	1	77327	BTS-270K	Output Grid See Note 7
R99	2200Ω	2		BT-2-2200	Voltage Dropping See Note 7
R100	2200Ω	2		BT-2-2200	Voltage Dropping See Note 7
R101	6.8 Meg.	1	77254	BTS-6.8 Meg.	Voltage Divider
R102	1 Meg.	1	77205	BTS-1 Meg.	1st Sync. Amp. Grid
R103	4700Ω	1	77429	BTA-4700	1st Sync. Amp. Plate
R104	4700Ω	1	77429	BTA-4700	1st Sync. Amp. Plate Decoupling
R105	1 Meg.	1	77205	BTS-1 Meg.	Sync. Sep. Grid
R106	4.7 Meg.	1	77253	BTS-4.7 Meg.	Vblitage Divider
R107	6800Ω	1	77148	BTS-6800	Sync. Sep. Plate
R108	1 Meg.	1	77205	BTS-1 Meg.	2nd Sync. Amp. Grid
R109	4700Ω	1	77211	BTS-4700	2nd Sync. Amp. Plate
R110	1000Ω 20%	1	77233	BTS-1000	Decoupling
R111	22KΩ	1	77198	BTS-22K	Voltage Divider
R112	22KΩ	1	77198	BTS-22K	Integrator
R113	8200Ω	1	77473	BTS-8200	Integrator
R114	8200Ω	1	77473	BTS-8200	Integrator
R115	1.5 Meg. 5%	1	77464	BTS-1.5Meg. 5%	Vert. Osc. Grid
R116	100KΩ	1	77201	BTS-100K	Voltage Divider
R117	2.2 Meg.	1	77206	BTS-2.2 Meg.	Voltage Divider
R118	220KΩ	1	77202	BTS-220K	Vert. Osc. Grid
R119	82000Ω 5%	1	77473	BTS-8200-5%	Vert. Peaking
R120	2.2 Meg.	1	77206	BTS-2.2 Meg.	Vert. Output Grid
R121	1800Ω	1	77506	BTS-1800	Vert. Output Cathode
R122	10KΩ	1	77022	BTA-10K	Vert. Output Plate Decoupling
R123	1 Meg.	1	77205	BTS-1 Meg.	Horiz. Sync. Disc. Load
R124	470KΩ	1	77204	BTS-470K	Horiz. Sync. Disc. Load
R125	470KΩ	1	77204	BTS-470K	Horiz. Sync. Disc. Load
R126	470KΩ	1	77204	BTS-470K	Horiz. AFC Filter Network
R127	560Ω	1	77414	BTS-560	Horiz. AFC Grid
R128	10Ω 5%	1	77455	BW-½-10-5%	Horiz. AFC Cathode
R129	39KΩ 5%	1	77470	BTA-39K-5%	Horiz. AFC Plate
R130	47KΩ 5%	1	77469	BTA-47K-5%	Horiz. AFC Plate
R131	39KΩ 5%	1	77470	BTA-39K-5%	Horiz. AFC Screen
R132	27KΩ	1	77456	BTA-27K	Voltage Divider
R133	27KΩ	1	77410	BTS-27K	Horiz. Osc. Grid
R134	5000Ω	7	77484	AB-5000	Horiz. Osc. Plate-Wire Wound
R135	10KΩ	1	77022	BTA-10K	Horiz. Osc. Screen
R136	6800Ω	1	77148	BTS-6800	Differentiator
R137	220KΩ	1	77202	BTS-220K	Horiz. Discharge Grid
R138	680KΩ	1	77381	BTS-680K	Horiz. Discharge Plate See Note 8
R139	47Ω 20%	1	77219		Parasitic Supp.
R140	47Ω 20%	1	77219		Parasitic Supp. See Note 9
R141	47Ω 20%	1	77219		Parasitic Supp. See Note 9
R142	47Ω 20%	1	77219		Parasitic Supp. See Note 9
R143	80Ω	4	77461-2		Horiz. Output Cathode-Wire Wound
R144	470KΩ 20%	1	77173	BTS-470K	Horiz. Output Grid
R145	9000Ω	5	650023A-1	AB-9000	Horiz. Output Screen-Wire Wound See Note 9
R146	47Ω 20%	1	77219		Parasitic Supp. See Note 9
R147	47Ω 20%	1	77219		Parasitic Supp. See Note 9
R148	56KΩ 20%	1	77346	BTS-56K	Filter
R149	.65Ω	4	77461-3		Filament Dropping-Wire Wound
R150	100Ω 20%	1	77176		Parasitic Supp. See Note 9
R151	68KΩ	1	77010	BTA-68K	Damper Grid See Note 9
R152	1 Meg.	1	77205	BTS-1 Meg.	Voltage Divider See Note 9
R153	3.3Ω	1	77492		HV Rect. Filament See Note 10
R154	3.3Ω	1	77492		HV Rect. Filament See Note 10
R155	470KΩ	2	77507		HV Rect. Load See Note 11
R156	470KΩ	2	77507		HV Rect. Load See Note 11
R157	1 Meg.	1	77368		HV Filter
R158	270Ω	2	77495	BW-2-270	Focus Coil Shunt
R159	270Ω	2	77495	BW-2-270	Focus Coil Shunt See Note 12
R160	1000Ω	4	77461-1	AB-1000	Focus Coil Shunt See Note 13
R161	8200Ω	2		BT-2-8200	Horiz. Output Screen See Note 14
R162	8200Ω	2		BT-2-8200	Horiz. Output Screen See Note 14
R163	560KΩ	1			HV Rect. Load See Note 14
R164	560KΩ	1			HV Rect. Load See Note 14
R165	100KΩ 20%	2	77483	BT-2-100K	Bleeder Network
R166A	1360Ω	25	77481		Filter-Wire Wound
B	250Ω	25			Bias Network-Wire Wound
R167A	53Ω	2	77480		Bias Network-Wire Wound
B	1KΩ	1			Bias Network-Wire Wound
C	6750Ω	20			Bleeder-Wire Wound
R168	4.7Ω	1	77505	BW-1-4.7	Horiz. Sync. Disc. Filament-Wire Wound

Note 3. Not used on chassis U12A.
Note 4. Used only in chassis U12A.
Note 5. Used only on audio chassis A13.
Note 6. Some models use three resistors in parallel to obtain required resistance and wattage.
Note 7. Used only on chassis C-267.
Note 8. HV chassis C265 and C266 use 390KΩ resistor in this application.
Note 9. Not used on HV chasis C265 and C266.
Note 10. HV chassis C265 and C266 use a 4.7Ω, 1 watt resistor in this application.
Note 11. HV chassis C265 and C266 use 560KΩ, 1 watt resistor in this application.
Note 12. Not used with 10 picture tube.
Note 13. When using 10" picture tube, a 1000Ω, 4 watt resistor is added in parallel.
Note 14. Used only on HV chassis C265 and C266.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA CAPEHART PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.
T1	117VAC at 2.66A 117VAC at .55A	730VCT .375ADC 700VCT .072ADC	5VAC at 6A 5VAC at 2A	6.3VAC at 4.5A 6.3VAC at 1.2A	94259 94231	P-6013	P-2953	PH-90
T2								

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (FILAMENT)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	CAPEHART PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T3	117VAC at .59A	6.3VAC at 10.8A			94264	P-6308 ③	P-2948 ③	F-610 ③

③ Drill new mounting holes.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	DC RESISTANCE		CAPEHART PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.					
T4	42Ω CT	39Ω Tap at 9.5Ω	38972				Hor. Disc. Transformer
T5	160Ω	1370Ω	38973	A-8121	A-4000	TBO-1	Vert. Block Osc. Trans.
T6	168Ω Tap at 29Ω	SEC. 1 3.1Ω Tap at .4Ω	750002A	A-8119		TFB-4	Hor. Output Trans.
		SEC. 2 0Ω					
		SEC. 3 0Ω					
T7	535Ω	6.6Ω	94273	A-8116	A-3035	TSO-4	Vert. Output Trans.
T8A	13.4Ω		38986	DY-1			Hor. Deflection Coil
B	60Ω						Vert. Deflection Coil
T9A	820Ω		65000IA-2 ④				Focus Coil
B			65000IA-1 ⑤				Focus Coil
C	355Ω		38955 ⑥				Focus Coil

④ Used in 12" models.
⑤ Used in 10" models.
⑥ Used in 10" or 12" models.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		CAPEHART PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T10	7500Ω CT	4Ω	430Ω CT	.3Ω	Part of 81192	A-3824	A-2936 ⑦	RO-305 ⑦	⑦Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	CAPEHART PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	4Ω	81192	ST-102 ① MOD. P12-S	12A6A ②	① Replace output transformer to match 6-8Ω voice coil. ② Remount output transformer.
	CONE DIA.	V. C. DIA.				
SP2	11 1/2"	1"				

FILTER CHOKE

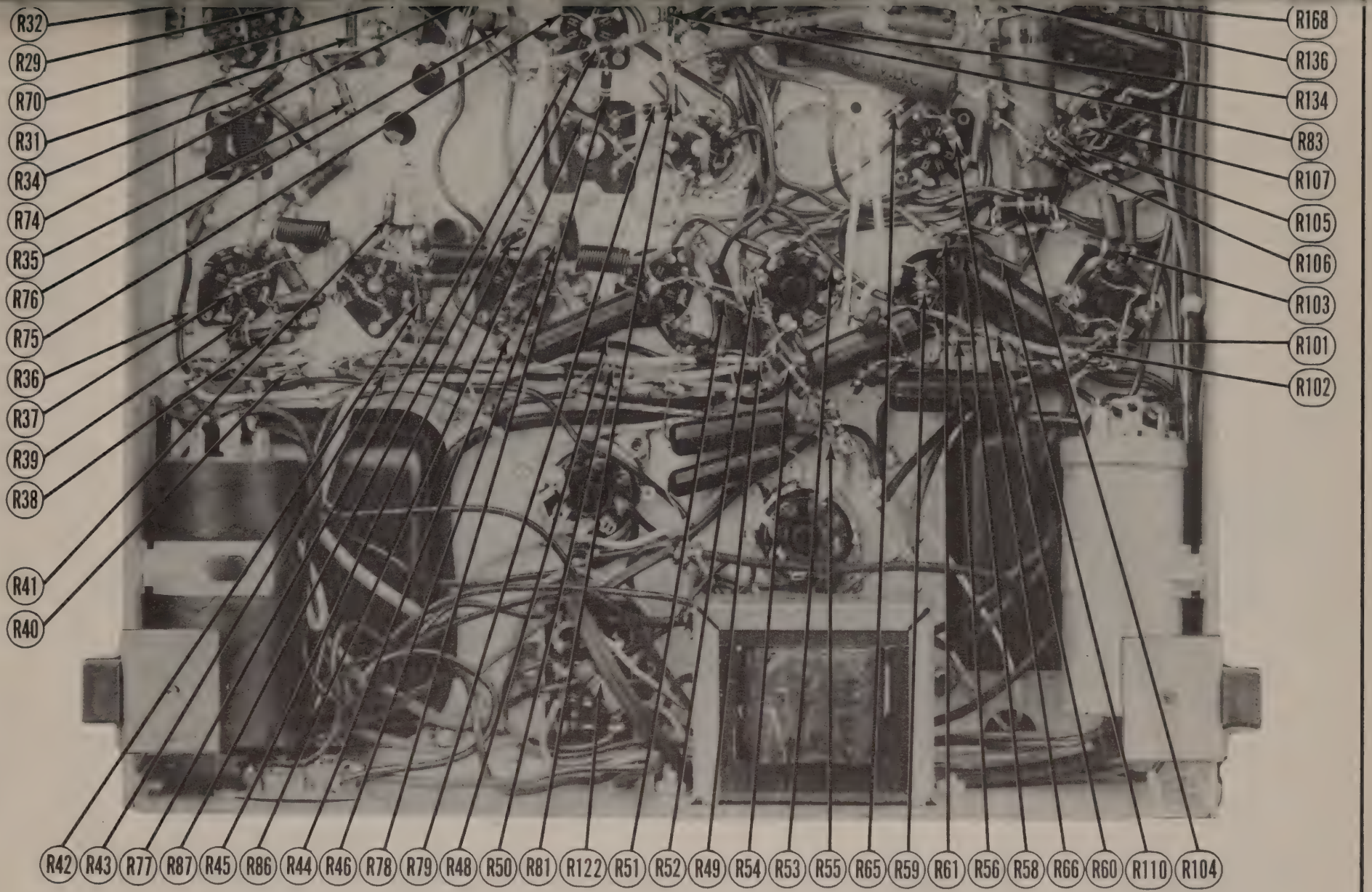
ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ↶)	CAPEHART PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.375A	27Ω	.7 Henries	94265	C-2326⑦			⑦ Drill one new mounting hole.

COILS (RF-IF)

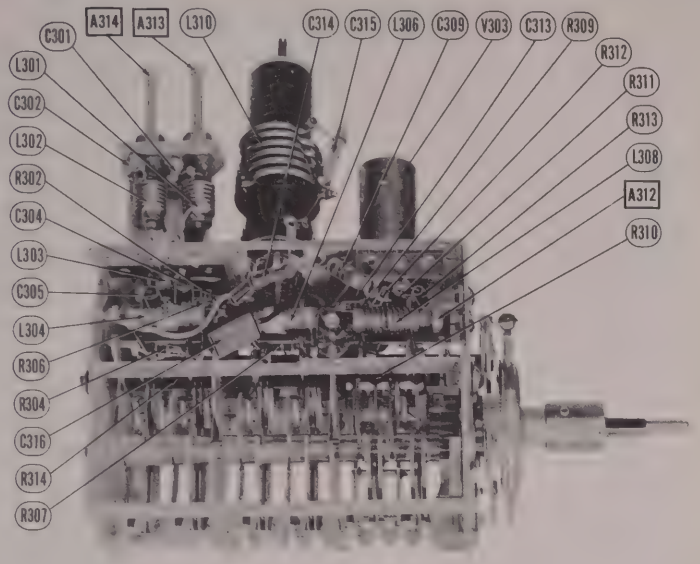
ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	CAPEHART PART No.	MEISSNER PART No.	
L2	Ant. Input	0Ω				Part of tuner.
L3	Interference Trap	0Ω				Part of tuner.
L4	Interference Trap	0Ω				Part of tuner.
L5	Fil. Choke	0Ω				Part of tuner.
L6	Mixer Grid Trap	0Ω				Part of tuner.
L7	1st Video IF & Sound Trap	.2Ω	0Ω			Part of tuner.
L8	2nd Video IF	.1Ω		38966		
L9	Fil. Choke	0Ω		38977		
L10	3rd Video IF	.1Ω		38967		
L11	Fil. Choke	0Ω		38977		
L12	4th Video IF	.1Ω		38968		
L13	Fil. Choke	0Ω		38977		
L14	Sound Trap	0Ω		38969		
L15	Fil. Choke	0Ω		38977		
L16	5th Video IF	.1Ω		38968		
L17	Fil. Choke	0Ω		38977		
L18	Peaking	9Ω		38975		120 microhenries. Wound on 22KΩ resistor.
L19	Peaking	8Ω		38974		250 microhenries.
L20	Peaking	9Ω		38975		120 microhenries. Wound on 22KΩ resistor.
L21	Peaking	5Ω		38975		93 microhenries
L22	Peaking	9Ω		38975		120 microhenries. Wound on 22KΩ resistor.
L23	1st Sound IF	.1Ω	.1Ω	38970		
L24	2nd Sound IF	.1Ω	.1Ω	38970		
L25	Disc. Trans.	.1Ω	.1Ω	38971		
L26	Width Cont.	.1Ω		39249		Used on HV chassis C-263 and C-266 only.
L27	Hor. Linearity	36Ω		78173		Used on HV chassis C-265 and C266 only.
L28	Peaking	5Ω		38976		93 microhenries

MISCELLANEOUS

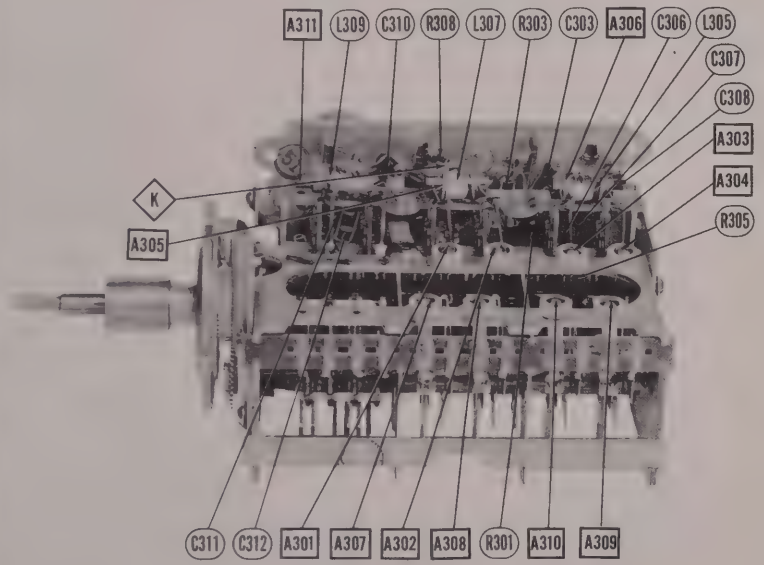
ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M1A	RF Tuner	13872	13 Channel
B	RF Tuner	13900	12 Channel
M2	Ion Trap		
M3	Fuse	48016	Type 3AG .25A
	Plug	80144-2	Jones Plug and cover.
	Socket	80086	Jones socket
	Ant. Terminal Strip	80498	



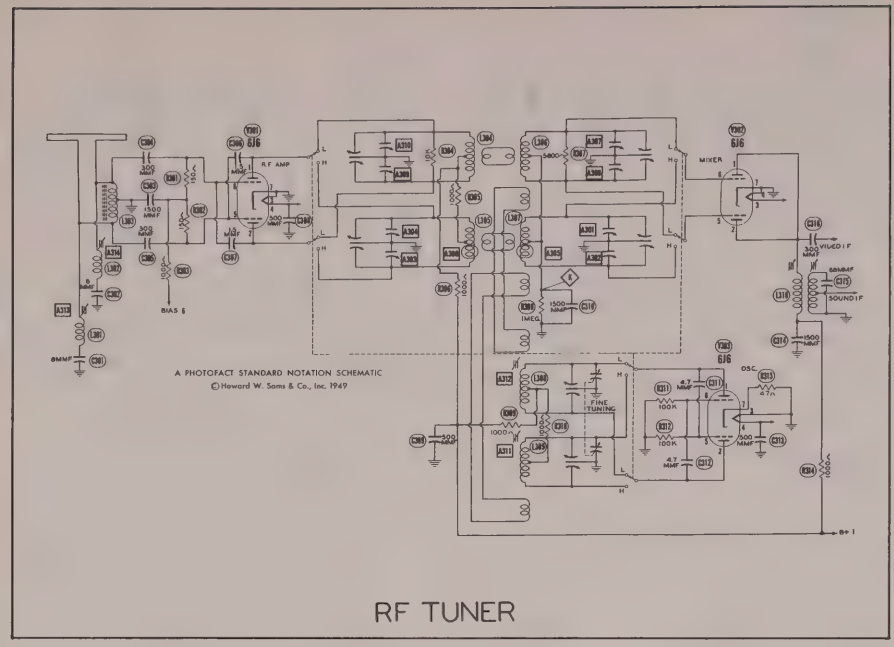
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE



RF TUNER

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: 6TANDARD REPLACEMENT	RMA BASE TYPE	
V301	RF Amp.	6J6	7bF	
V302	Mixer	6J6	7BF	
V303	Oscillator	6J6	7BF	

CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT	IDENTIFICATION
C301	8		Fixed Trimmer
C302	8		Fixed Trimmer
C303	1500		Bias Filter
C304	300		RF Coupling
C305	300		RF Coupling
C306	1.5		Neutralizing
C307	1.5		Neutralizing
C308	500		Filament Bypass
C309	500		RF Bypass
C310	1500		Mixer Grid Filter
C311	4.7		Osc. Feedback
C312	4.7		Osc. Feedback
C313	500		Filament Bypass
C314	1500		Mixer Decoupling
C315	68		Fixed Trimmer
C316	300		IF Coupling

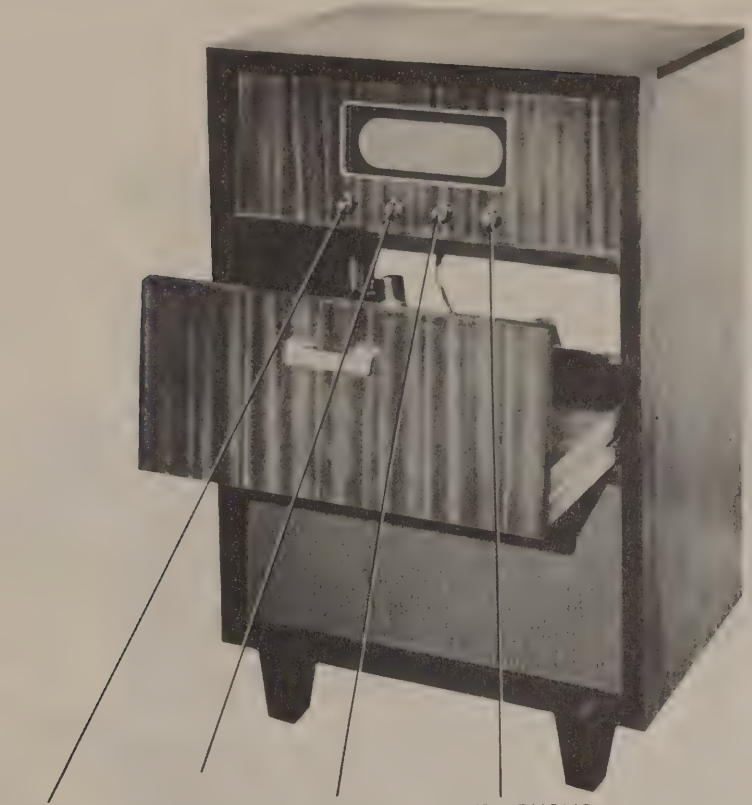
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	IDENTIFICATION
R301	150Ω	½	RF Grid
R302	150Ω	½	RF Grid
R303	1000Ω	½	Bias Filter
R304	10KΩ	½	RF Coil Shunt
R305	1000Ω	½	RF Plate
R306	1000Ω	½	RF Plate
R307	5600Ω	½	Mixer Coil Shunt
R308	1 Meg.	½	Mixer Grid
R309	1000Ω	½	Osc. Plate
R310	1000Ω	½	Osc. Plate
R311	100KΩ	½	Osc. Grid
R312	100KΩ	½	Osc. Grid
R313	47Ω	½	Osc. Cathode
R314	1000Ω	½	Mixer Decoup.

COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	
L301	Interference Trap	0Ω		
L302	Interference Trap	0Ω		
L303	Ant. Input	0Ω		
L304	RF Low Band	0Ω		
L305	RF High Band	0Ω		
L306	Mixer Low Band	0Ω		
L307	Mixer High Band	0Ω		
L308	Osc. Low Band	0Ω		
L309	Osc. High Band	0Ω		
L310	IF Trans.	.2Ω	0Ω	

CORONADO
MODEL 94RA1-43-7751A



CORONADO
MODEL 94RA1-43-7751A

CORONADO MODEL 94RA1-43-7751A

TRADE NAME	Coronado, Model 94RA1-43-7751A		
SUPPLIER	Gamble-Skogmo Inc., 15 N. 8th St., Minneapolis, Minnesota		
TYPE SET	AC Operated Combination Phono-Radio, AM- FM Superheterodyne Receiver with Loop Antenna		
TUBES(SEVEN)	Types 6BA7 Converter, 6BA6 1st IF Amp., 6BA6 FM 2nd IF Amp., 6AL5 Ratio Det., 6AV6 DET-AVC-AF, 6V6GT Power Output, 6X5GT Rectifier		
POWER SUPPLY	110-120 Volts AC	RATING	.31 Amp. at 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC	FREQ. MOD.	88-108MC

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove six screws holding rear cover. Remove cover.
3. Remove phono pick-up and motor plugs from rear of radio chassis.
4. Remove speaker plugs from speaker.
5. Remove two phillips head screws holding top of loop.
6. Remove three 1/4 " hex head bolts holding chassis. Remove chassis.
7. Remove four hex nuts holding speaker. Remove speaker.

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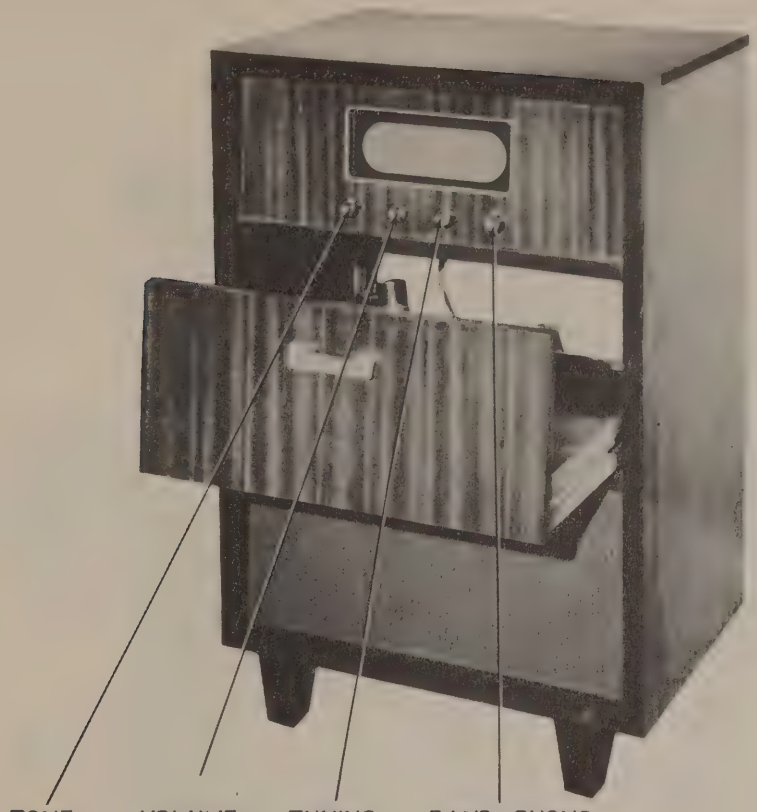
CORONADO
MODEL 94RA1-43-7751A



CORONADO
MODEL 94RA1-43-7751A

CORONADO MODEL 94RA1-43-7751A

TRADE NAME	Coronado, Model 94RA1-43-7751A	
SUPPLIER	Gamble-Skogmo Inc., 15 N. 8th St., Minneapolis, Minnesota	
TYPE SET	AC Operated Combination Phono-Radio, AM- FM Superheterodyne Receiver with Loop Antenna	
TUBES(SEVEN)	Types 6BA7 Converter, 6BA6 1st IF Amp., 6BA6 FM 2nd IF Amp., 6AL5 Ratio Det., 6AV6 DET-AVC-AF, 6V6GT Power Output, 6X5GT Rectifier	
POWER SUPPLY	110-120 Volts AC	RATING .31 Amp. at 117 Volts AC
TUNING RANGE-BROADCAST	540-1600KC	FREQ. MOD. 88-108MC

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove six screws holding rear cover. Remove cover.
3. Remove phono pick-up and motor plugs from rear of radio chassis.
4. Remove speaker plugs from speaker.
5. Remove two phillips head screws holding top of loop.
6. Remove three 1/4 " hex head bolts holding chassis. Remove chassis.
7. Remove four hex nuts holding speaker. Remove speaker.

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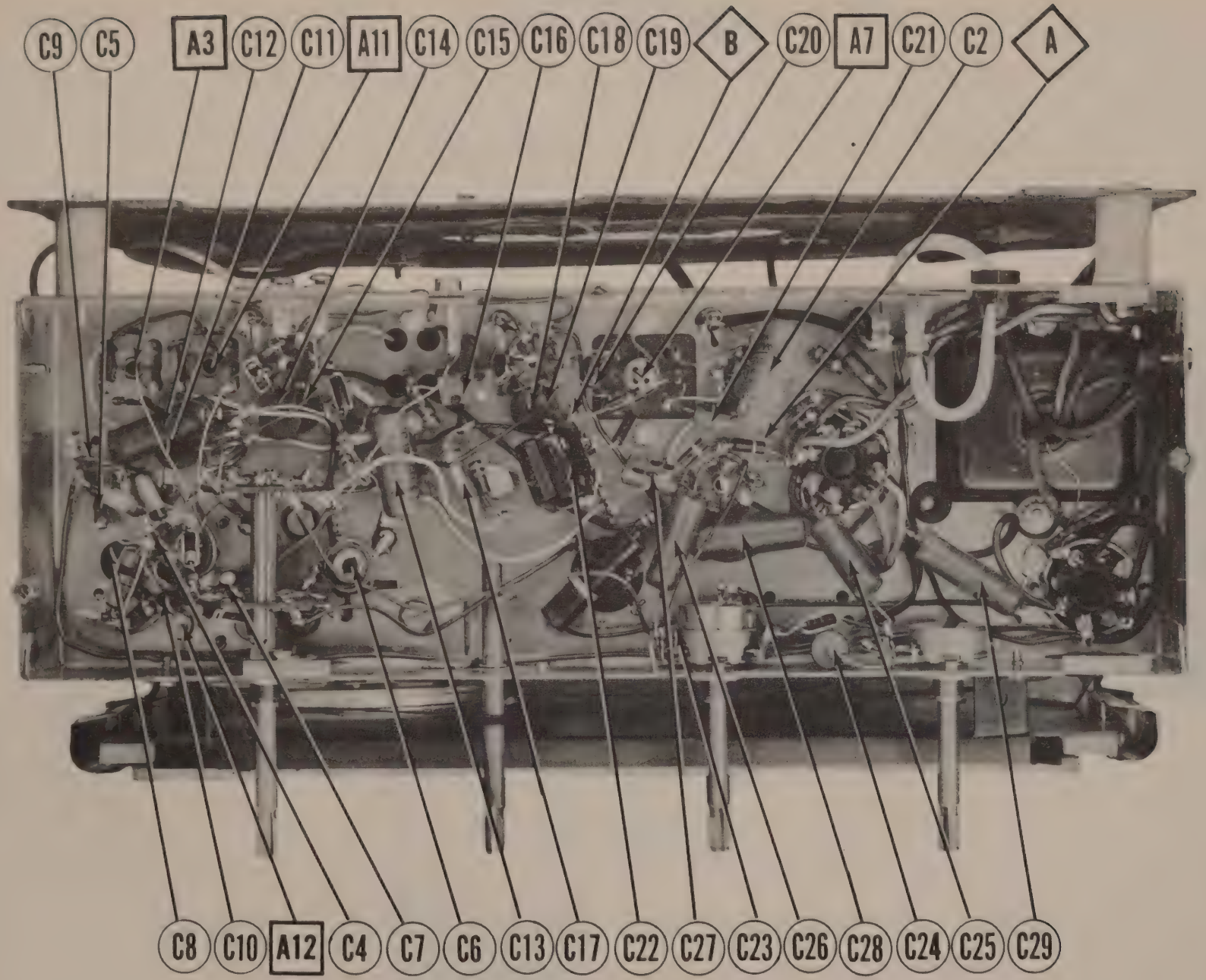
C9
C5
A3
C12
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A11
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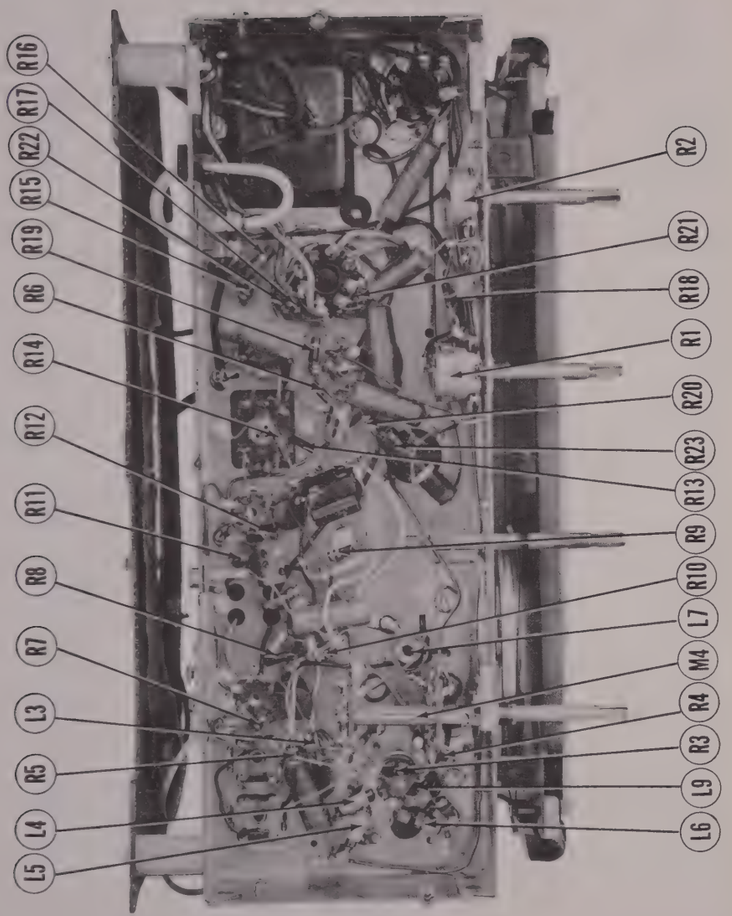

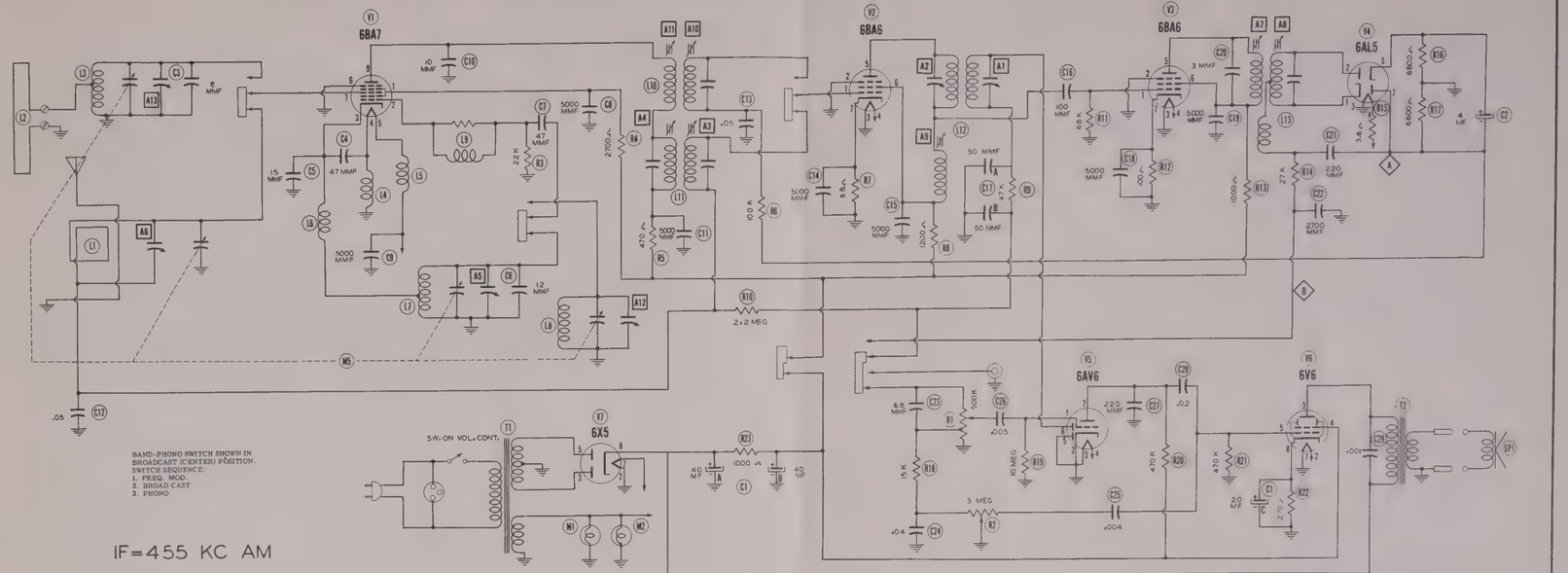

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1A	6BA7	92VDC	1-7.8VDC	0V.	6.3VAC	0V.	0V.	-.9VDC	0V.	120VDC
♦ V1B	6BA7	96VDC	1-2.7VDC	0V.	6.3VAC	0V.	0V.	0V.	0V.	112VDC
V2	6BA6	8VDC	0V.	0V.	6.3VAC	107VDC	107VDC	.8VDC		
† V3	6BA6	0V.	0V.	0V.	6.3VAC	100VDC	100VDC	1.3VDC		
♦ V4	6AL5	-.1VDC	-.1VDC	0V.	6.3VAC	.2VDC	0V.	-.2VDC		
V5	6AV6	-.7VDC	0V.	0V.	6.3VAC	0V.	-.5VDC	70VDC		
V6	6V6GT	0V.	6.3VAC	150VDC	130VDC	0V.	0V.	0V.	5.6VDC	
V7	6X5GT	0V.	0V.	165VAC	0V.	165VAC	0V.	6.3VAC	160VDC	

‡ TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1A	6BA7	13.7KΩ	22KΩ	2.5Ω	1Ω	1Ω	.9Ω	2.7Meg.	0Ω	11.5KΩ
♦ V1B	6BA7	13.7KΩ	22KΩ	2.5Ω	1Ω	0Ω	0Ω	0Ω	0Ω	11.5KΩ
V2	6BA6	2.7Meg.	0Ω	0Ω	1Ω	12.2KΩ	12.2KΩ	8MΩ		
† V3	6BA6	68KΩ	1Ω	0Ω	1Ω	12K	12KΩ	100Ω		
♦ V4	6AL5	527KΩ	527KΩ	0Ω	1Ω	6.8KΩ	0Ω	6.8KΩ		
V5	6AV6	10Meg.	0Ω	0Ω	1Ω	0Ω	527KΩ	1470KΩ		
V6	6V6GT	Inf.	1Ω	1430Ω	11000Ω	470KΩ	0Ω	0Ω	270Ω	
V7	6X5GT	Inf.	0Ω	1200	Inf.	125Ω	Inf.	1Ω	54KΩ	

† MEASURED FROM PIN 8 OF V1

♦ TAKEN IN FM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.
When complete receiver alignment is to be performed, the order outlined should be followed.
The AM IF system should be aligned before attempting FM IF alignment.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (Grid) of 6BA7 (V1). Low side to chassis.	455KC (400 ~ Mod.)	AM (counter clockwise)	Tuning gang fully open.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	.1MFD	"	1620KC	"	"	"	A5	"
3.		Loop	1400KC	"	Tune for max. output.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	2500MMF	High side to pin 1 (Grid) of 6BA6 (V3). Low side to chassis	10.7MC (Unmod.)	FM (center)	Tuning gang fully open	DC Probe to Point A Common to chassis.	A7	Adjust for maximum deflection. Note reading on VTVM
5.	2500MMF	"	"	"	"	DC Probe to Point B Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	2500MMF	High side to pin 1 (Grid) of 6BA6 (V2). Low side to chassis.	"	"	"	DC Probe to Point A Common to chassis.	A9	Adjust for maximum deflection. Attenuate signal generator to maintain same VTVM reading as obtained in step 4.
7.	2500MMF	High side to pin 7 (Grid) of 6BA7 (V1). Low side to chassis	"	"	"	"	A10, A11	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ~ modulation and 450KC sweep. Use 120 ~ sawtooth voltage in scope for horizontal deflection

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	2500MMF	High side to pin 1 (Grid) of 6BA6 (V2). Low side to chassis	10.7MC (450KC Sweep)	FM (center)	Point of non-interference	Vert. Amp. to Point A Low side to chassis.	A7	Disconnect stabilizer capacitor C3. Adjust for maximum amplitude and symmetry as per Fig 1.
5.	2500MMF	High side to pin 1 (Grid) of 6BA6 (V2). Low side to chassis	"	"	"	"	A9	"
6.	2500MMF	High side to pin 7 (Grid) of 6BA7 (V1). Low side to chassis	"	"	"	"	A10, A11	"
7.	2500MMF	"	"	"	"	"	A8, A7	Reconnect capacitor C2. Adjust A8 so 10.7MC occurs at center of crossover lines as per Fig 2. Slightly retouch A7 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω carbon res.	High side thru 300Ω to ungrounded FM antenna terminal Low side to chassis. Remove hank ant.	108-4MC (Unmod.)	FM	Tuning gang fully open	DC Probe to Point A Common to chassis.	A12	Adjust for maximum deflection.
9.	"	"	104-5MC	"	Tune for max. deflection.	"	A13	Adjust for maximum deflection.

FIG. 1

FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	6BA7	6BA7	8CT	
V2	1st IF Amp.	6BA6	6BA6	7BK	
V3	FM 2nd IF Amp.	6BA6	6BA6	7BK	
V4	Ratio Det.	6AL5	6AL5	6BT	
V5	1st Audio-AF	6AT6	6AT6	7AT	
V6	Power Output	6V6GT	6V6GT	7AC	
V7	Rectifier	6X5GT	6X5GT	8S	

CHASSIS—TOP VIEW

PARTS LIST AND DESCRIPTIONS

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: ARROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	300	452360		UT4445C		ET-432*	▲ Filter
B	40	150						■ Filter, Cathode Bypass
C	10	150		SR8150/4	B8415		UT-41	Stabilizing Cap.
C2	.1		452361					Fixed Trimmer
C3	4		472531	1468-00005	SWFQ5	GP2K-47	1FM-45	Osc. Feedback
C4	.47		472533			GP2K-15	MS-415	Osc. Feedback
C5	.15		472532			GP2K-12		Fixed Trimmer
C6	.12		472532	1468-00005	SWFQ5	GP2K-47	1FM-45	Osc. Feedback
C7	5000		472507	1467-005	1D5D5	811-005	28C1	Osc. Anode Bypass
C8	5000		472507	1467-005	1D5D5	811-005	28C1	Filament Bypass
C9	5000		472507	1468-00005	SWFQ5	811-005	28C1	Filament Bypass
C10	5000	200	472507	1467-005	1D5D5	811-005	28C1	Conv. Plate Decoupling
C11	.05	200	B98503	P288-05	PTE5A5			AVC Filter
C12	.05	200	B98503	P288-05	PTE5A5			AVC Filter
C13	5000	200	472507	1467-005	1D5D5	811-005	28C1	1st IF Cathode Bypass
C14	5000		472507	1467-005	1D5D5	811-005	28C1	1st IF Decoupling
C15	5000		472507	1467-005	1D5D5	811-005	28C1	1st IF Decoupling
C16	5000	500	472507	1468-00005	SWFQ5	GP2K-30	1FM-45	Diode RF Filter
C17A	50		472518	1468-00005	SWFQ5	GP2K-30	1FM-45	Diode RF Filter
B	50			1468-00005	SWFQ5	GP2K-30	1FM-45	Diode RF Filter Bypass
C18	5000		472507	1467-005	1D5D5	811-005	28C1	2nd IF Decoupling
C19	5000		472507	1467-005	1D5D5	811-005	28C1	2nd IF Decoupling
C20	3					NPOX-3		Fixed Trimmer See Note
C21	220	500	472498	1468-00025	SWF725	GP2K-220	1FM-325	Fixed Cap.
C22	2700	500	472492	1467-0025	1W5D25	GP2M-0027	1FM-23	De-emphasis
C23	68	500	472471	1469-00007	SWFQ7	GP2K-68	MS-47	Tone Compensation
C24	680	500	472481	1468-0001	SWFQ10		MS-47	Tone Compensation
C25	.004	600	B98403	P288-004	PTE5D5		TM-24	Tone Compensation
C26	.005	600	D98502	P288-005	PTE5D5	GP2M-005	TM-25	Audio Coupling
C27	.025	400	D98503	P288-0025	PTE5E5	GP2K-250	TM-225	Audio Cathode Bypass
C28	.02	400	D98203	P488-02	PTE5E5	GP2K-220	TM-13	Audio Coupling
C29	.001	800	B98103	P1088-001	PTE5H5D		TR-21	Output Plate Bypass

* Omit 20MFD section.
Note: .1MA used in all models.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	1	383372	Q13-153X	AT-78	Volume control, tapped at 150KΩ
B	500KΩ		Not Req.	Q13-153X	AT-78	Volume control, tapped at 150KΩ
R2A	Switch		Not Req.	78-1	RW-A	Attach to R1A per instructions
B	3 Meg.	1	Not Req.	Q13-140	AM-67-Z	Tone Control
	Shaft		403285	Not Req.	3255-3	Attach to R2A per instructions

SET 87

FOLDER 3

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R3	22KΩ		B98233	BTS-22K	Osc. Grid
R4	270KΩ		B98273	BTS-270K	Converter Plate
R5	47KΩ		B98473	BTS-470	Conv. Plate Decoupling
R6	100KΩ		B98503	BTS-100K	AVC Network
R7	1MEG		B98504		1st IF Cathode Bypass
R8	120Ω		B98122	BTS-1200	1st IF Decoupling
R9	47KΩ		B98473	BTS-47K	Diode Filter
R10	68KΩ		B98683	BTS-68K	2nd FM IF Cathode
R11	68KΩ		B98683	BTS-68K	2nd FM IF Grid
R12	10MEG		B98104		2nd FM IF Decoupling
R13	10MEG		B98103	BTS-1000	2nd FM IF Decoupling
R14	27KΩ		B98273	BTS-27K	De-emphasis
R15	3.3Ω			BW-1-3.3	Ratio Det. Filament-Wire Wound
R16	68KΩ		B98683	BTS-68K	Ratio Det. Diode Load
R17	68KΩ		B98683	BTS-6800	Ratio Det. Diode Load
R18	15KΩ		B98153	BTS-15K	Tone Compensation
R19	10 MEG		B98104	BTS-10MEG	AF Plate
R20	470KΩ		B98474	BTS-470K	Output Grid
R21	470KΩ		B98474	BTS-470K	Output Cathode
R22	270KΩ		B98271	BW-1-270	Filter
R23	680KΩ	2	B98683	BW-2-680	Filter

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	CHICAGO PART No.
T1	117VAC at .31A	350VCT 105MADC	6.3VAC at 2.8A		53X291	P-8348 †	P-3047 †	PB-708 †

† Drill saw mounting holes and add series resistor to reduce plate voltage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	INSTALLATION NOTES
T2	6.2KΩ	3.3Ω	43Ω	8Ω	51X334	A-3833	A-2930 #	RO-9 #	# Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS FIELD	RATINGS V. C. IMP.	RATINGS V. C. DIA.	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	INSTALLATION NOTES
SP1	CORE DIA.	3.2Ω	3"/4"	124477	ST-11	M090 1P8-T	8A31
SP2	CORE DIA.	V. C. DIA.	3/4"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: MEISSNER PART No.
L1	AM Loop	2Ω	1Ω	9A3053	
L2	FM Dipole	0Ω		9A3303	
L3	FM Ant.	0Ω		9A3956	
L4	FM 1st Osc.	1Ω		9A3957	
L5	FM Osc. Choke	0Ω		9A3044	

PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: MEISSNER PART No.
L6	RF Choke	2.5Ω		35X5	
L7	AM Osc.	6Ω		9A1097	14-108u
L8	FM Osc.	0Ω		9A3221	
L9	Ant. Trimmer Supply	0Ω		9A1940	2 microhenries
L10	1st FM IF	1.5Ω	1.5Ω	9A2037	16-6678
L11	2nd FM IF	1Ω	1Ω	9A1993	2 turns wound on 150Ω resistor.
L12	2nd IF AM	13Ω	13Ω	9A1999	
	Ratio Det. Trans.	.5Ω			
L13	Ratio Det. Trans.	3Ω	0Ω	9A2036	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	REPLACEMENT DATA: BEAD COLOR	REPLACEMENT DATA: CORONADO PART No.	NOTES
M1	Bayonet	6-8	.15	Brown	7A103	Type #47
M2	Bayonet	6-8	.15	Brown	7A103	Type #47

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: CORONADO PART No.	REPLACEMENT DATA: ASTATIC PART No.	REPLACEMENT DATA: SHURE PART No.	REMARKS
M3	16-0			

MISCELLANEOUS

ITEM No.	PART NAME	CORONADO PART No.	NOTES
M4	Switch	2A175	
M5	2 Gang Var. Cap.	14A204	Band (14-498MMF; 31-297MMF)
A6	Trimmer	17A188	BC Ant. Adj;
A7	Trimmer	17A185	FM Osc. Adj;
	Dial Glass	58X725	
	Dial Pointer	15X591	
	Escutcheon	10A1668	Tuning
	Knob	10A700	Off-Volume
	Knob	10A701	Tone
	Knob	10A1732	Band

DAVID BOGEN
MODEL HO125

DAVID BOGEN
MODEL HO125

TRADE NAME	David Bogen Model HO125
MANUFACTURER	David Bogen Co., Inc., 663 Broadway, New York 12, New York
TYPE SET	AC Operated Booster Audio Amplifier
TUBES(EIGHT)	Types 6SL7GT AF Amp.-Phase Inv., (2) 6SN7GT Drivers, (2) 807 Power Output, 6SN7GT Bias Regular, 5Y3GT Rectifier, 5R4GY Rectifier
POWER SUPPLY	110-120 Volts AC RATING 1.55 Amp. at 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

DAVID BOGEN
MODEL HO125

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: DAVID BOGEN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	AF Amp. -Phase Inverter	6SL7GT	6SL7GT	8BD	
V2	Driver	6SN7GT	6SN7GT	8BD	
V3	Driver	6SN7GT	6SN7GT	8BD	
V4	Power Output	807	807		
V5	Power Output	807	807		
V6	Bias Regulator	6SN7GT	6SN7GT	8BD	
V7	Rectifier	5Y3GT	5Y3GT	5T	
V8	Rectifier	5R4GY	5R4GY	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: DAVID BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	8	500		GL475/8-8	EB10018		CL-88	Filter- Green-Yellow
B	8	500						Filter- Red-Black
C2	50	50		PRS50/50	BR505		TVA-16	Bias Filter
C3	50	50		PRS50/50	BR505		TVA-16	AF Amp. Cath. Bypass
C4	2	1000		1009-2.0	T-10020		CR-21	Filter
C5	.01	600		P488-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C6	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C7	.05	400		P488-05	GT4S5		TM-15	Audio Coupling
C8	.001	600		P688-001	GT6D1	GP2L-001	TM-21	AF Feedback
C9	.5	400		484-5	GT4P5		TC-5	Fixed Trimmer
C10	.5	400		484-5	GT4P5		TC-5	Fixed Trimmer
C11	.1	600		630T-.1	DYRT-6010		BP-16	Line Filter

CONTROLS

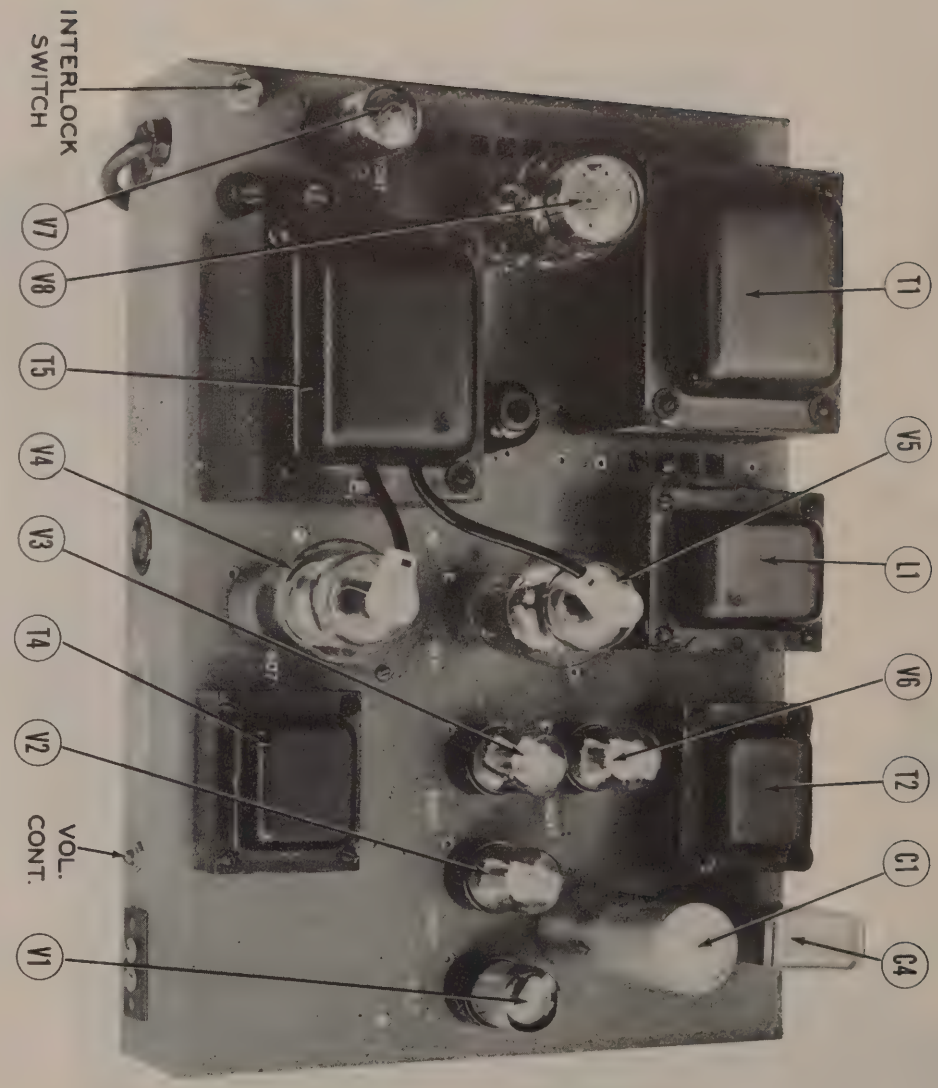
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: David Bogen PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	500KΩ	½	V-275	Q13-133	M-60-Z	Volume control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: DAVID BOGEN PART No.	IRC PART No.	IDENTIFICATION CODES
R2	680Ω	½		BTS-680	AF Cathode
R3	3900Ω 5%	1		BTA-3900-5%	AF Cathode
R4	270KΩ	½		BTS-270K	AF Plate
R5	3900Ω 5%	1		BTA-3900-5%	Phase Inv. Cathode
R6	15KΩ	½		BTS-15K	Phase Inv. Grid
R7	270KΩ	½		BTS-270K	Phase Inv. Plate
R8	500KΩ	½		BTS-470K	Tone Compensation
R9	500KΩ	½		BTS-470K	Drive Grid
R10	750Ω	½			Driver Cathode
R11	500KΩ	½		BTS-470K	Driver Grid
R12	750Ω	½			Driver Cathode
R13	47KΩ	½		BTS-47K	Feedback
R14	47KΩ	½		BTS-47K	Bias Regulator Grid
R15	500KΩ	½		BTS-470K	Bias Regulator Grid
R16	330KΩ	½		BTS-330K	Bias Regulator Grid
R17A	10KΩ	50		EPA-50K *	Bleeder-Wire Wound
B	40KΩ				Bleeder-Wire Wound
R18	1000Ω	10		ABA-1000 #	Bias Control-Wire Wound Adjustable
R19	50KΩ	½		BTS-47K	Series Neon
R20	50KΩ	½		BTS-47K	Series Neon
R21	500KΩ	½		BTS-470K	Voltage Divider

* Set slider 10KΩ from one end.
\# Set slider 450Ω from ground end.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC at 1.1A	1900VCT .078ADC	680VCT .100ADC		T357BU			

TRANSFORMER (FILAMENT)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T2	117VAC at .45A	5VAC at 2A	5VAC at 2A	6.3VCT at 4A	T360BU	P-6333 ③		

③ Drill new mounting holes.

TRANSFORMER (INPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T3					T-6 ①				①Used with low impedance input.

TRANSFORMER (DRIVER)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	INDUCTANCE		DC RES.		DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T4	10 Henries CT		140Ω		T119BU				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T5	4.8KΩ CT	140V 90Ω 70V	120Ω CT	3.4Ω 2.6Ω 1.7Ω	T254BU			PSO-80③	③Drill new mounting holes.

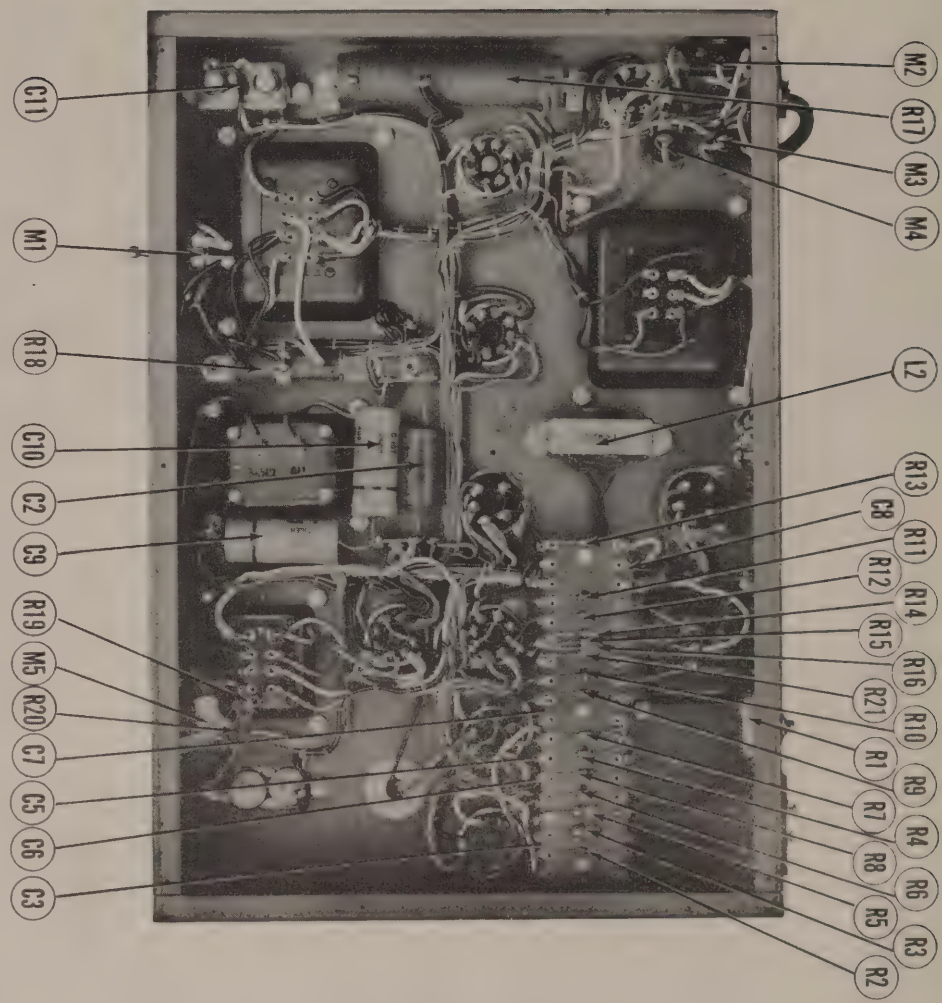
FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∽)	BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.078A	95Ω	7 Henries	T512BU	C-2309 ②		R-885 ②	② Drill one new mounting hole.
L2	.100A	190Ω	5.5 Henries	T501B			R-885	

MISCELLANEOUS

ITEM No.	PART NAME	BOGEN PART No.	NOTES
M1	Power Switch		
M2	Interlock Switch		
M3	Fuse		AGC - 5 Amp.
M4	Fuse		AGC - 1.5 Amp.
M5	Neon Bulb		Type NE 51

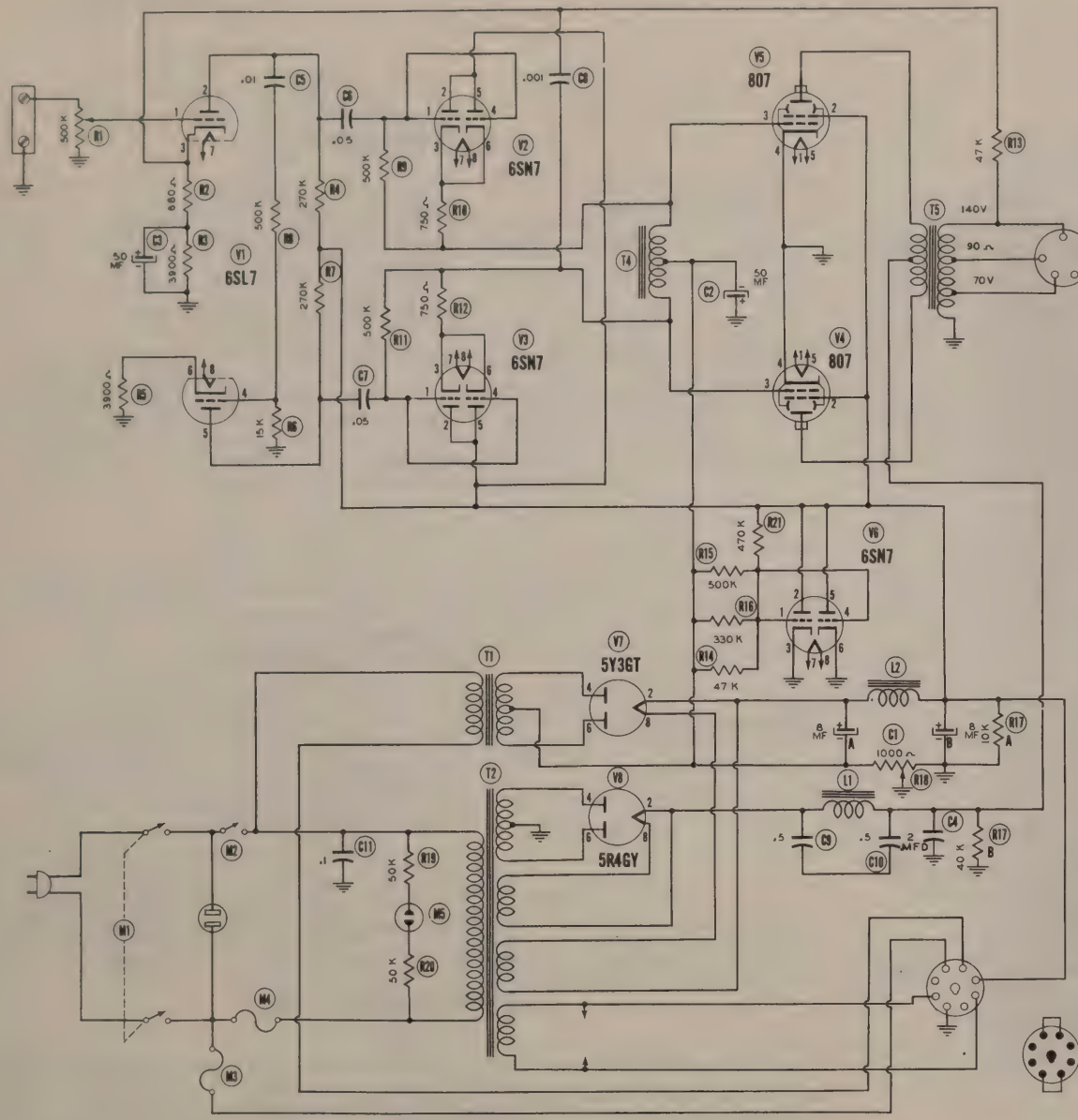
CHASSIS—BOTTOM VIEW



SET 87 FOLDER 4

DAVID BOGEN MODEL HO125

DAVID BOGEN MODEL HO125



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6SL7GT	0V.	170VDC	2.1VDC	0V.	170VDC	2.1VDC	¶3.2VAC	¶3.2VAC	
V 2	6SN7GT	-30VDC	300VDC	-20VDC	-30VDC	300VDC	-20VDC	¶3.2VAC	¶3.2VAC	
V 3	6SN7GT	-30VDC	300VDC	-20VDC	-30VDC	300VDC	-20VDC	¶3.2VAC	¶3.2VAC	
V 4	807	¶3.2VAC	300VDC	-35VDC	0V.	3.2VAC				TOP CAP 840VDC
V 5	807	¶3.2VAC	300VDC	-35VDC	0V.	¶3.2VAC				TOP CAP 840VDC
V 6	6SN7GT	-8VDC	300VDC	0V.	-8VDC	300VDC	0V.	¶3.2VAC	¶3.2VAC	
V 7	5Y3GT	0V.	315VDC	0V.	300VAC	0V.	300VAC	0V.	315VDC	
V 8	5R4GY	0V.	840VDC	0V.	995VAC	0V.	995VAC	0V.	840VDC	

¶ 6.3VAC MEASURED ACROSS FILAMENTS.
▲ MEASURED FROM CENTERTAP OF POWER TRANSFORMER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6SL7GT	500KΩ	†270KΩ	4KΩ	15KΩ	†270KΩ	4KΩ	.1Ω	.1Ω	
V 2	6SN7GT	470KΩ	†250Ω	1.3KΩ	470KΩ	†250Ω	1.3KΩ	.1Ω	.1Ω	
V 3	6SN7GT	470KΩ	†250Ω	1.3KΩ	470KΩ	†250Ω	1.3KΩ	.1Ω	.1Ω	
V 4	807	.1Ω	†250Ω	590Ω	0Ω	.1Ω				TOP CAP #150Ω
V 5	807	.1Ω	†250Ω	580Ω	0Ω	.1Ω				TOP CAP #140Ω
V 6	6SN7GT	40KΩ	†250Ω	0Ω	40KΩ	†250Ω	0Ω	1Ω	1Ω	
V 7	5Y3GT	Inf.	10KΩ	Inf.	▲50Ω	Inf.	▲49Ω	Inf.	10KΩ	
V 8	5R4GY	Inf	40KΩ	Inf.	80Ω	Inf.	88Ω	Inf.	40KΩ	

† MEASURED FROM PIN 8 OF V7.
# MEASURED FROM PIN 8 OF V8.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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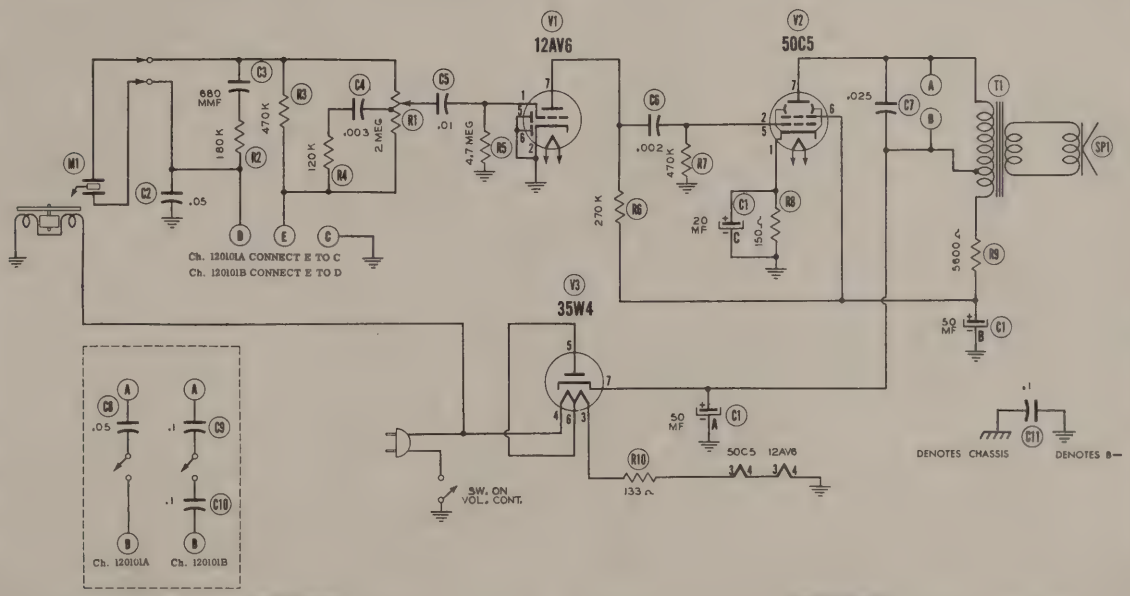
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance on component values makes possible a variation of - 15% in voltage and resistance readings.
6. Volume control at minimum, proper output load connected.

EMERSON
MODELS 590, 623 (Ch. 120101A, B)

EMERSON MODEL 623

TRADE NAME	Emerson Models 590, 623 (Ch. 120101A, 120101B)
MANUFACTURER	Emerson Radio and Phonograph Corp., 111 8th Ave., New York 11, New York
TYPE SET	AC Operated Phonograph with 3 Tube Amplifier
TUBES (THREE)	Types 12AV6 AF Amp., 50C5 Power Output, 35W4 Rectifier

POWER SUPPLY 105-125 Volts AC RATING .22 Amp. at 117 Volts AC



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AV6	-.6VDC	0V.	12VAC	0V.	0V.	0V.	55VDC
V 2	50C5	6VDC	0V.	60VAC	12VAC	0V.	90VDC	110VDC
V 3	35W4	117VDC	117VDC	77VAC	117VAC	105VAC	105VAC	117VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AV6	4.7 Meg.	0Ω	12Ω	0Ω	0Ω	0Ω	†270KΩ
V 2	50C5	150Ω	470KΩ	60Ω	12Ω	470KΩ	†5.6KΩ	†150Ω
V 3	35W4	30KΩ	30KΩ	195Ω	230Ω	215Ω	215Ω	30KΩ

† MEASURED FROM PIN 7 OF V3.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	AF Amp.	800034	12AV6	7BT	
V2	Power Output	800032	50C5	7CV	
V3	Rectifier	800526	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150	925152	AF1010D4A	UP5515C		EL-352	■ Filter
B	50	150						▲ Filter
C	20	25						Output Cathode Bypass
C2	.05	400	920030	P488-05	PTE4S5		TM-15	Phono Isolation
C3	680		910009	1468-00075	IW5T7	GP2K-680	1FM-37	Tone Compensation
C4	.003	600	920544	P688-003	PTE6D3	GP2M-003	TM-23	Tone Compensation
C5	.01	400	920092	P488-01	PTE4S1	821-01	TM-11	Audio Coupling
C6	.002	400	920515	P688-002	PTE6D2	GP2M-002	TM-22	Audio Coupling
C7	.025	400	920220	P488-025	PTE4S2		TM-12	Output Plate Bypass
C8	.05	400	920030	P488-05	PTE4S5		TM-15	Tone Compensation Note 1
C9	.1	400	920250	P488-1	PTE4P1		TM-1	Tone Compensation Note 2
C10	.1	400	920250	P488-1	PTE4P1		TM-1	Tone Compensation Note 2
C11	.1	400	920250	P488-1	PTE4P1		TM-1	Line Isolation

Note 1. Used only in chassis 120101A
Note 2. Used only in chassis 120101B

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	2 Meg.	½	390083	Q13-139X	AT-115	Volume control, tapped at 500KΩ
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	IRC PART No.	IDENTIFICATION CODES
R2	180KΩ	½	341030	BTS-180K	Tone Compensation
R3	470KΩ	½	351130	BTS-470K	Volume Control Shunt
R4	120KΩ	½	340990	BTS-120K	Tone Compensation
R5	4.7 Meg.	½	351370	BTS-4.7 Meg.	AF Grid
R6	270KΩ	½	351070	BTS-270K	AF Plate
R7	470KΩ	½	351130	BTS-470K	Output Grid
R8	150Ω	1	370290	BW-1-150	Output Cathode
R9	5600Ω	1	370670	BW-1-5600	Filter
R10	133Ω 5%	5	394160		Filament Dropping-Wire Wound

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: EMERSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T1	2.5KΩ	3.7Ω	170Ω Tap at 6Ω	.6Ω	734049	A-3330	A-3031	RO-3	

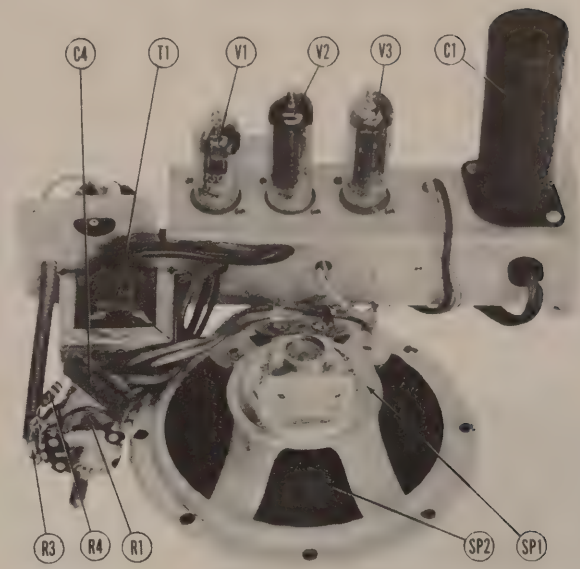
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: EMERSON PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-105	5A07	
SP1	PM	3.7Ω	180045	MOD. P5-X		
	CONE DIA.	V. C. DIA.				
SP2	4 3/4"	9/16"				

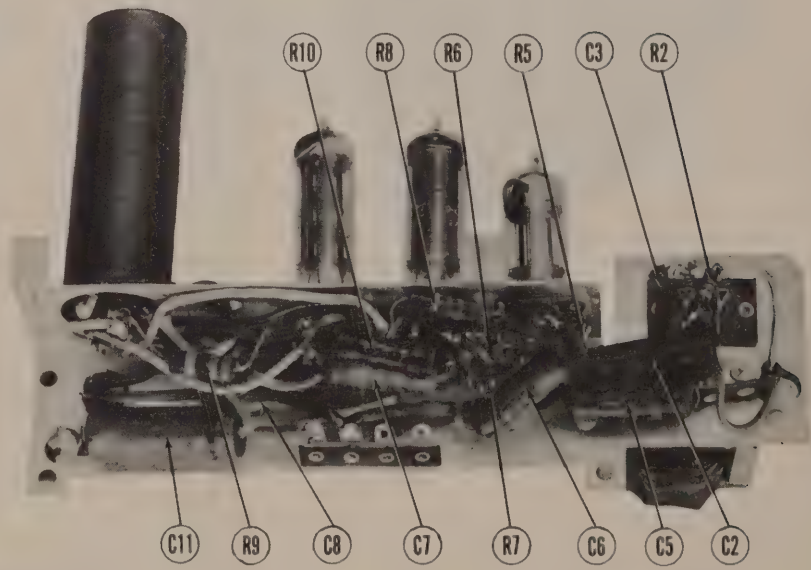
PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: EMERSON PART No.	ASTATIC PART No.	SHURE PART No.	REMARKS
M1		CQ-J or GC-J		

CHASSIS—TOP VIEW



CHASSIS—BOTTOM VIEW



PHOTOFACT* Folder

EMERSON MODELS
600, 639 (CH. 120103B)

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EMERSON MODELS
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MODEL 600

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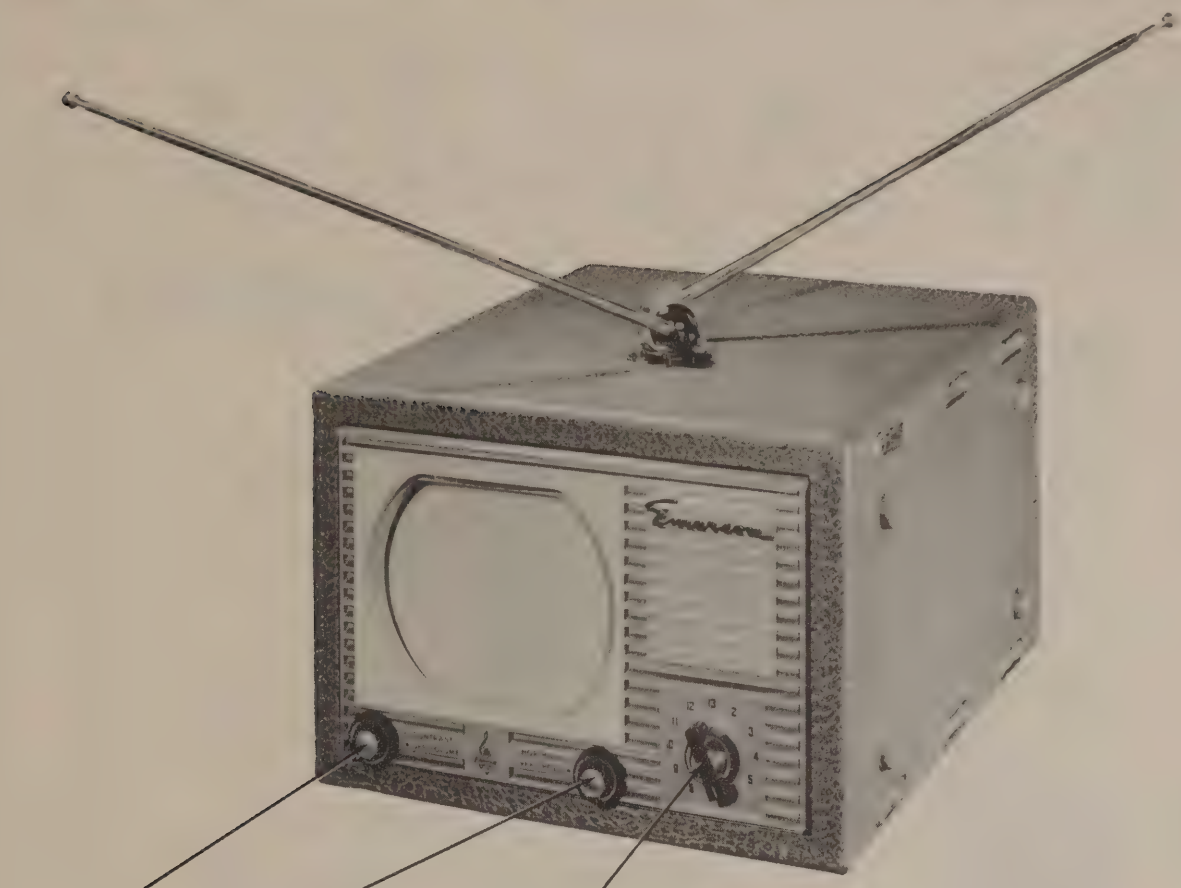
Date 3/50 Set No. 87—Folder No. 6

EMERSON
MODELS 600, 639 (Ch. 120103B)



EMERSON
MODELS 600, 639 (Ch. 120103B)

EMERSON MODEL 600

TRADE NAME	Emerson Models 600, 639 (Ch. 120103B)
MANUFACTURER	Emerson Radio and Phono Corp., 111 Eighth Ave., New York 11, New York
TYPE SET	Televison Receiver
TUBES	Twenty One
POWER SUPPLY	110 - 120 Volts AC or DC
RATING	.98 Amp. at 117 Volts AC
TUNING RANGE-	Channels 2 thru 13

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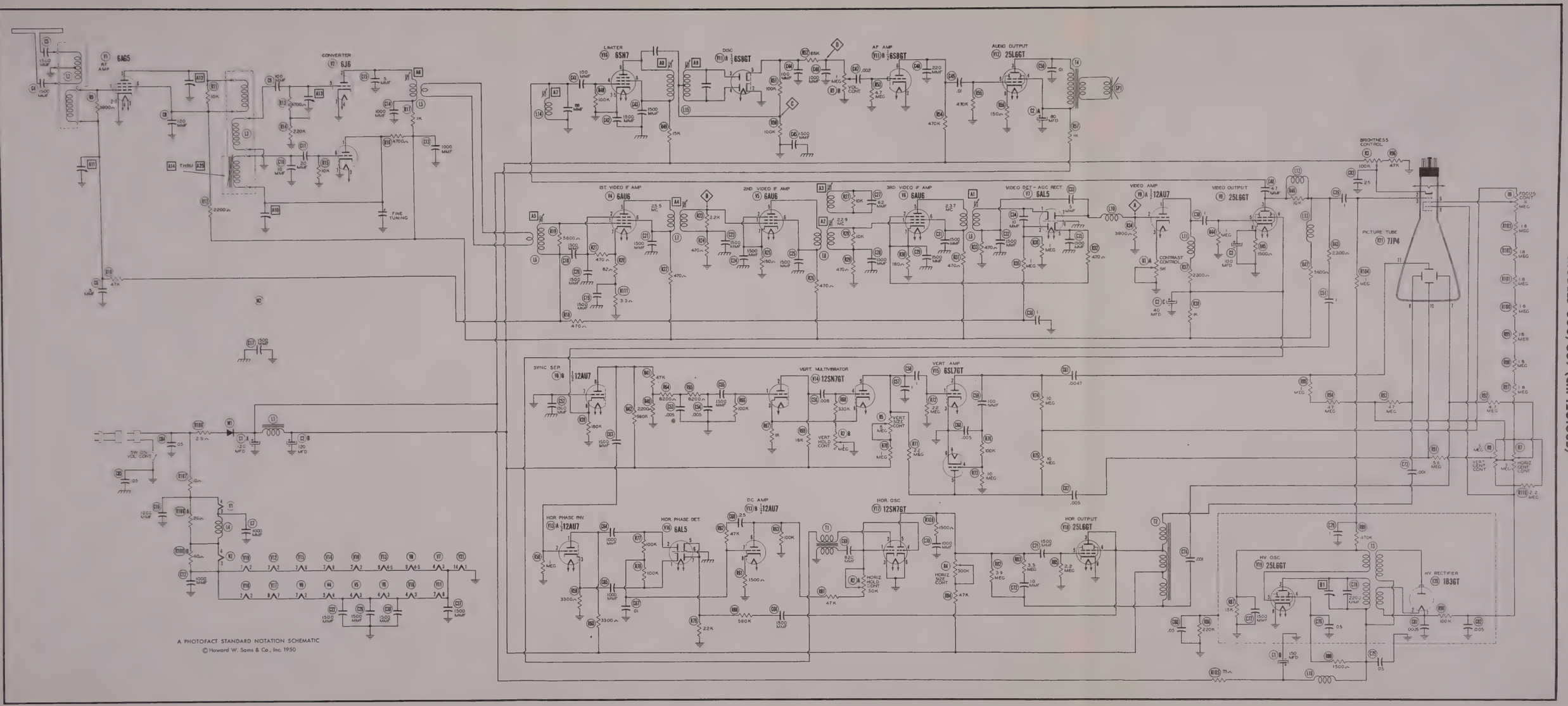
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MODELS 600, 639 (Ch. 120103B)
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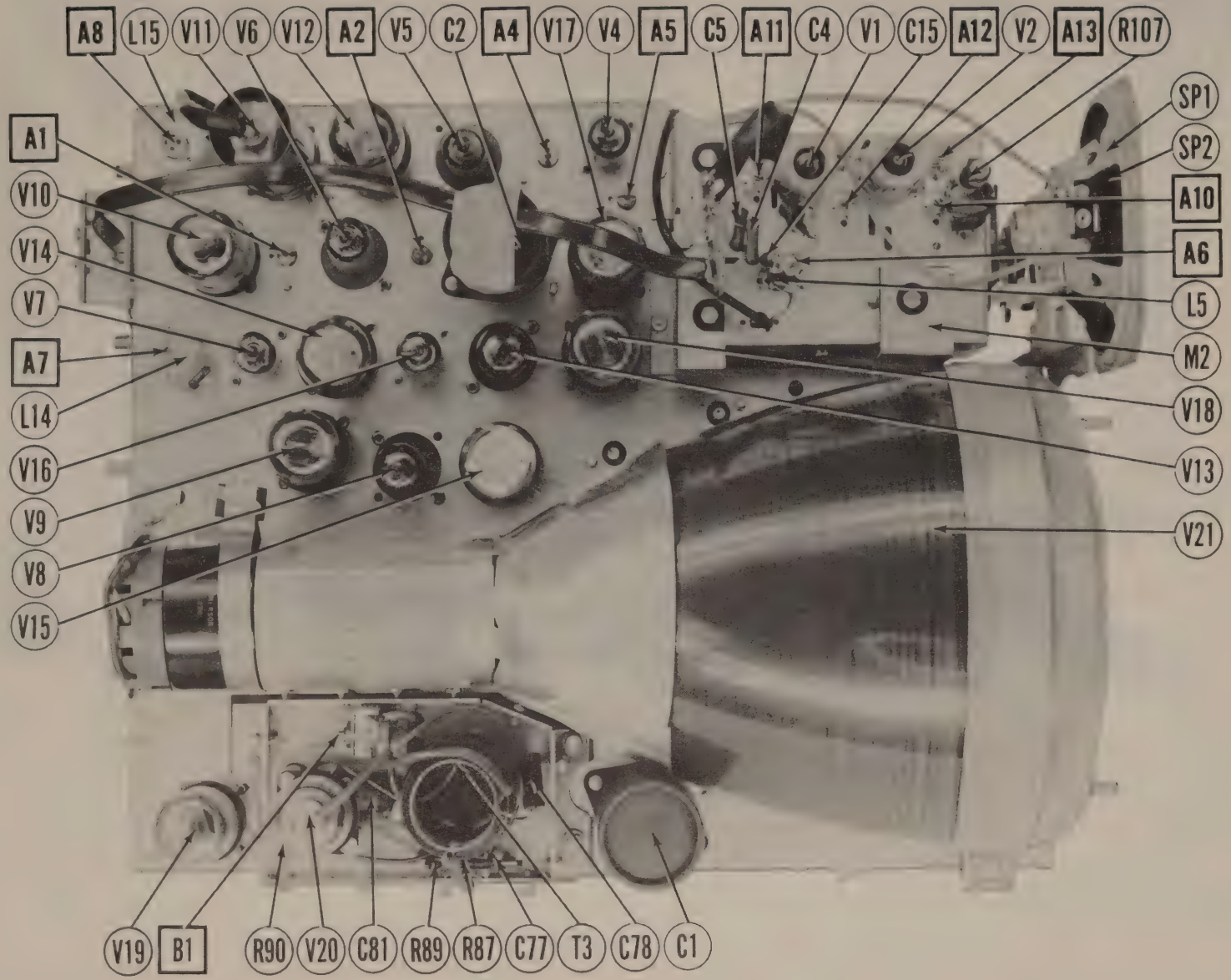
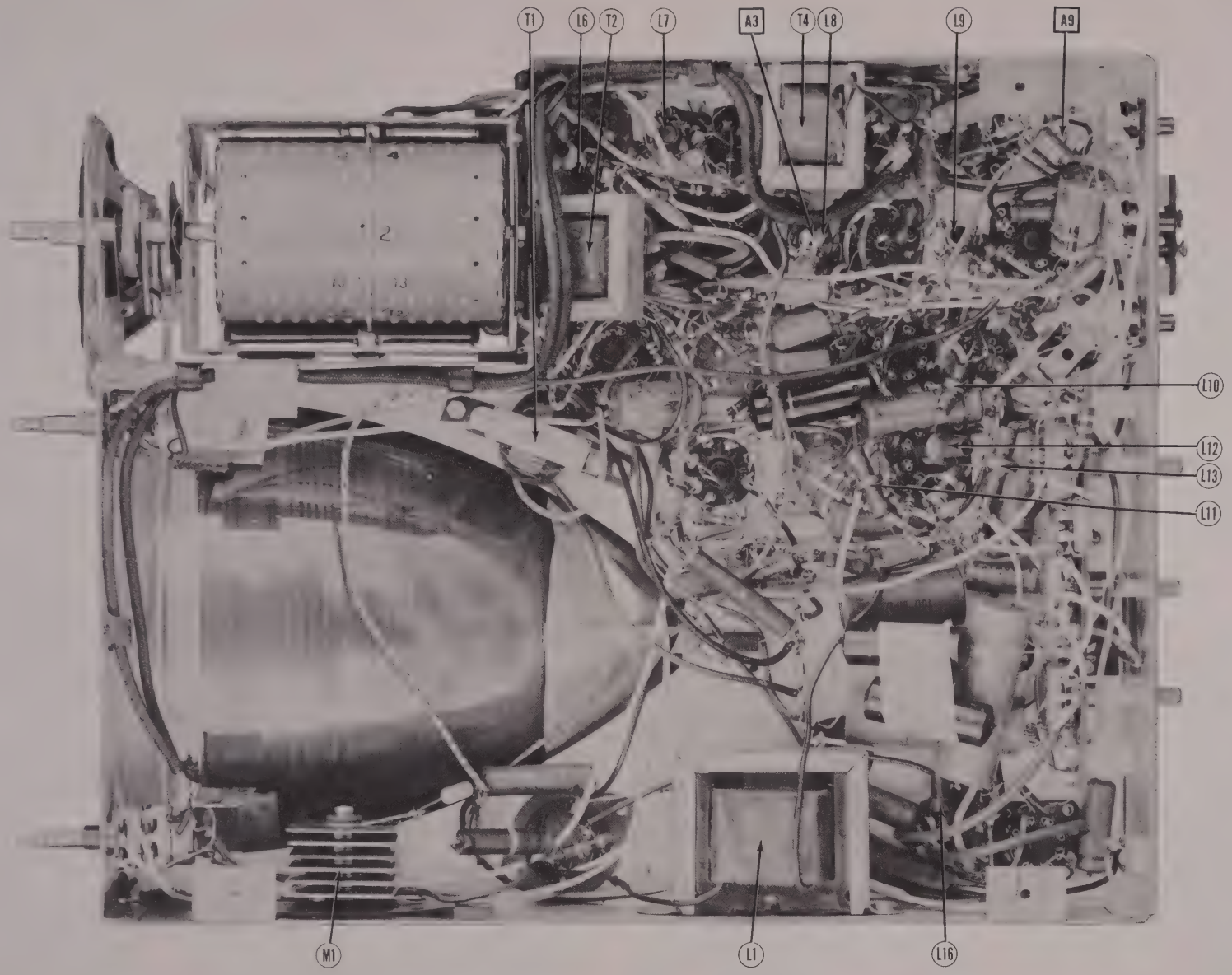
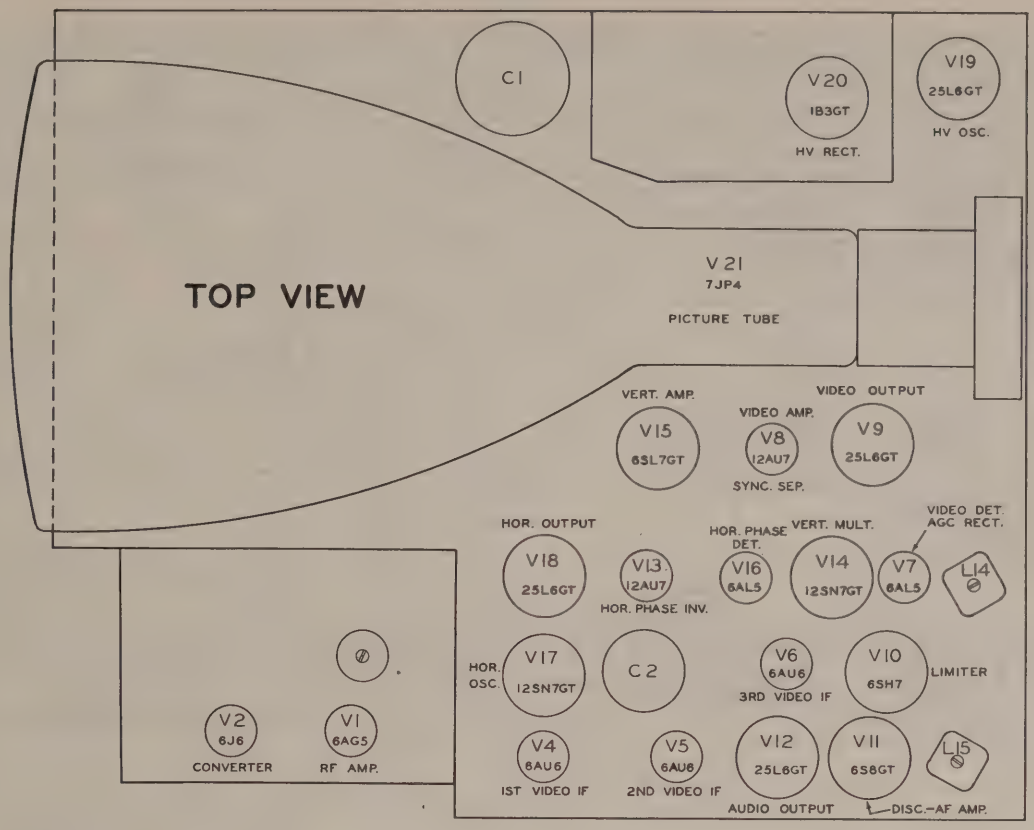
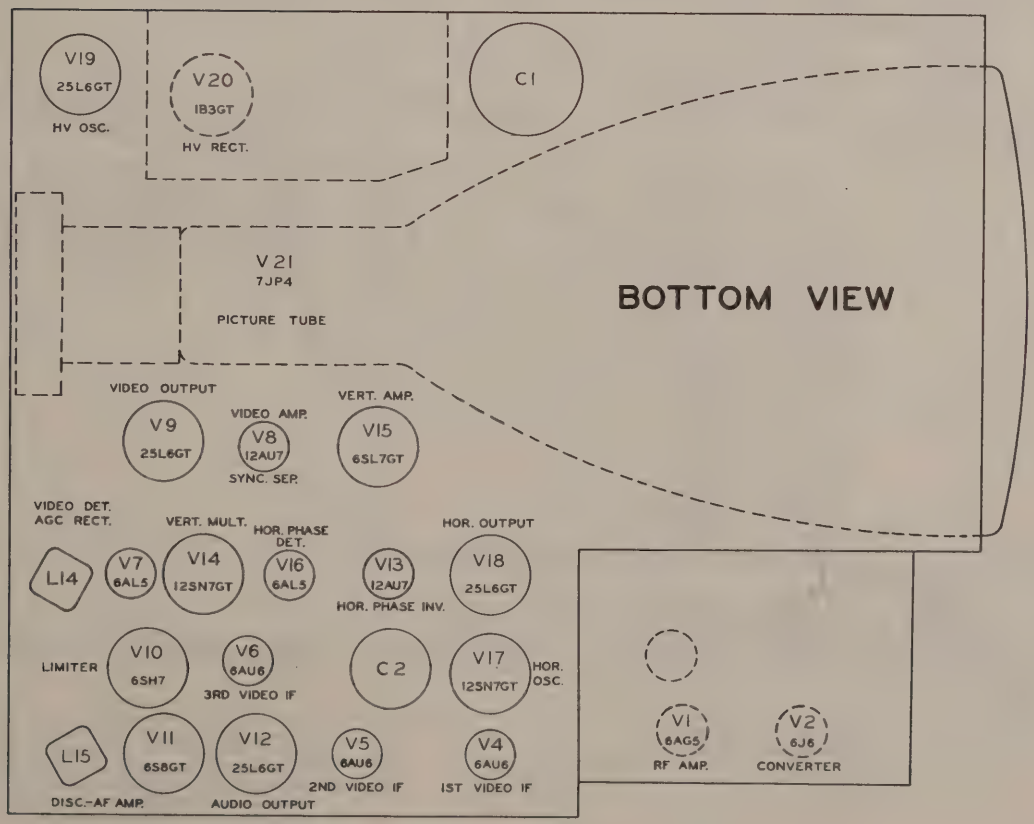


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
Set the contrast control to the mid-position of its range.

VIDEO IF ALIGNMENT

If the set has a Standard Coil tuner, remove the channel 13 segment of the converter section of the tuner turret and turn the channel selector to 13 to disable the local oscillator.
If the set has a General Instrument tuner remove the local oscillator tube (V3) from its socket.
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (Grid) of 6AU6 (V4). Low side to B-.	23.7MC (Unmod.)	13	DC Probe to Point (A) Common to chassis.	A1	Adjust for maximum deflection.
2.	.001MFD	"	22.9MC	"	"	A2	"
3.	.001MFD	"	21.25MC	"	"	A3	Adjust for MINIMUM deflection.
4.	.001MFD	"	25.5MC	"	"	A4	Adjust for maximum deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to ungrounded tube shield floating over converter tube (V2). Low side to TUNER CHASSIS.	24.5MC (10MC Sweep)	21.25MC 25.75MC	13	Vert. Amp. thru detector probe (Fig 1) to Point (B) Low side to chassis.	A5, A6	Adjust for response curve similar to Fig 2 with markers as shown.
6.	Direct	"	"	25.75MC 22.6MC 21.25MC	13	Vert. Amp. to Point (A) Low side to chassis.		Check for response curve similar to Fig 3. If necessary retouch A1 thru A6 for proper response.

SOUND IF ALIGNMENT

Use frequency modulated signal with 60 ~ modulation and 450KC sweep. Use 120 ~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 5 (Grid) of 25L6 (V9). Low side to B-.	4.5MC (1MC Sweep)	4.5MC	Any channel not used locally	Vert. Amp. thru 100KΩ to Point (C) Low side to B-.	A7, A8	Adjust for maximum amplitude and symmetry as per Fig 4.
8.	.01MFD	"	"	"	"	Vert. Amp. to Point (D) Low side to B-.	A9, A8	Adjust A9 so 4.5MC occurs at center of crossover lines as per Fig 5. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

RF MIXER AND OSCILLATOR ALIGNMENT (STANDARD COIL TUNER)

The overall oscillator circuit adjustment A10 is pre-set at the factory and should not require adjustment in the field. The oscillator adjustment for each channel is accessible through the hole just to the right of the channel switch shaft as the switch is turned to each channel.
Set the fine tuning control to maximum clockwise.
Replace the channel 13 segment of the tuner turret.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	300Ω carbon res.	Across antenna terminals with 300Ω in high side of generator output.	207MC (10MC SWP)	205.25MC 209.75MC	12	Vert. Amp. to Point (A) Low side to B-.	A11, A12, A13, A14	Adjust A11, A12 and A13 for response curve similar to Fig 6. Adjust A14 to place sound marker as shown in Fig 6.
10.	"	"	213MC (10MC SWP)	211.25MC 215.75MC	13	"	A15	Adjust to place sound marker as shown in Fig 6. If optimum performance is desired on any channel, make slight adjustment of A11, A12 and A13 with channel switch set for that channel. Recheck all channels to see that they have not been seriously effected.
			201MC (10MC SWP)	199.25MC 203.75MC	12		A16	
			195MC (10MC SWP)	193.25MC 197.75MC	10		A17	
			189MC (10MC SWP)	187.25MC 191.75MC	9		A18	
			183MC (10MC SWP)	181.25MC 185.75MC	8		A19	
			177MC (10MC SWP)	175.25MC 179.75MC	7		A20	
			85MC (10MC SWP)	83.25MC 87.75MC	6		A21	
			79MC (10MC SWP)	77.25MC 81.75MC	5		A22	
			69MC (10MC SWP)	67.25MC 71.75MC	4		A23	
			63MC (10MC SWP)	61.25MC 65.75MC	3		A24	
			57MC (10MC SWP)	55.25MC 59.75MC	2		A25	

OSCILLATOR ALIGNMENT (GENERAL INSTRUMENT TUNER)

Replace the local oscillator tube (V3).

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	300Ω carbon res.	Across antenna leads with 300Ω resistor in high side of generator output.	213MC (10MC SWP)	211.25MC 215.75MC	13	Vert. Amp. to Point (A) Low side to B-.	A311	Adjust to place sound marker as shown in Fig 6.
10.	"	"	85MC (10MC SWP)	83.25MC 87.75MC	6	"	A312	Adjust to place sound marker as shown in Fig 6. Check all channels to see that the sound marker can be properly placed well within the range of the fine tuning control. If not compromise may be made using A311 for channels 7 thru 13 and A312 for channels 2 thru 6.

RF AND MIXER ALIGNMENT (GENERAL INSTRUMENT TUNER)

The coupling adjustment rings (A305 and A308) are pre-set and sealed at the factory, they should not require adjustment in the field.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	300Ω carbon res.	Across antenna terminals with 300Ω resistor in high side of generator output.	213MC (10MC SWP)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to Point K Low side to B- (Tuner chassis.)	A301, A302, A303, A304	Adjust for response curve similar to Fig 7 with markers as above 70%.
12.	"	"	207MC (10MC SWP)	205.25MC 209.75MC	12	"		Check all high band channels for response similar to Fig 7. If markers are below 70% on any channel make slight adjustment of A301, A302, A303 and A304 with channel switch set for that channel. Recheck all high band channels to see that they have not been seriously effected.
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			183MC (10MC SWP)	181.25MC 185.75MC	8			
			177MC (10MC SWP)	175.25MC 179.75MC	7			
13.	"	"	85MC (10MC SWP)	83.25MC 87.75MC	6	"	A307, A308, A309, A310	Adjust for response curve similar to Fig 7 with markers above 70%.
14.	"	"	79MC (10MC SWP)	77.25MC 81.75MC	5	"		Check all low band channels for response similar to Fig 7. If markers are below 70% on any channel, make slight adjustment of A307, A308, A309 and A310 with channel switch set for that channel. Recheck all low band channels to see that they have not been seriously effected.

WAVE TRAP ADJUSTMENT (GENERAL INSTRUMENT TUNER)

Wave traps A313 and A314 are used for specific types of interference and their alignment will depend upon the type encountered. With the receiver tuned to the channel having the interference, set the fine tuning control until the interference is at maximum. Adjust A313 and A314 for minimum interference in both the sound and picture, keeping the cores at approximately the same relative position. Turn one core $\frac{1}{2}$ turn, adjust the other for minimum interference.

FIG. 1

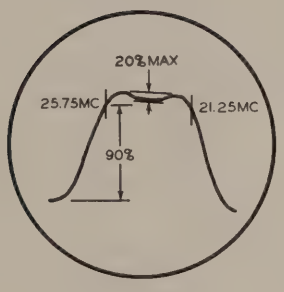


FIG. 2

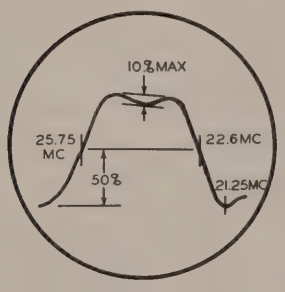


FIG. 3

FIG. 4

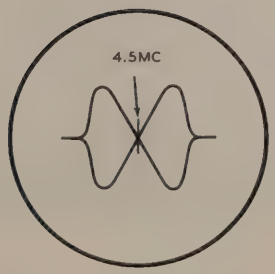


FIG. 5

FIG. 6

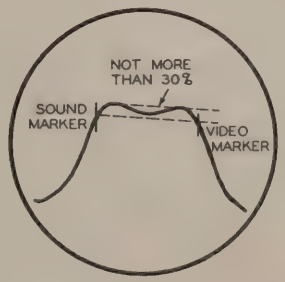


FIG. 7

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.5VDC	0V.	105VAC	110VAC	105VDC	105VDC	0V.		
V 2	6J6	85VDC	125VDC	95VAC	105VAC	-1.8VDC	§-2.6VDC	0V.		
V 3										
V 4	6AU6	-.4VDC	.6VDC	38VAC	32VAC	125VDC	125VDC	.6VDC		
V 5	6AU6	0V.	1.5VDC	24VAC	32VAC	125VDC	125VDC	1.5VDC		
V 6	6AU6	0V.	1.4VDC	18VAC	24VAC	125VDC	125VDC	1.4VDC		
V 7	6AL5	0V.	-.2VDC	6VAC	12VAC	1.2VDC	.4VDC	-.2VDC		
V 8	12AU7	115VDC	-.2VDC	5.6VDC	12VAC	12VAC	8VDC	0V.	1.2VDC	18VAC
V 9	25L6GT	-.2VDC	38VAC	87VDC	120VDC	0V.	120VDC	63VAC	14VDC	
V 10	6SH7	.4VDC	24VAC	0V.	-.4VDC	0V.	55VDC	30VAC	55VDC	
V 11	6S8GT	0V.	0V.	-.3VDC	-.3VDC	0V.	55VDC	12VAC	6VAC	TOP CAP .6VDC
V 12	25L6GT	0V.	49VAC	90VDC	95VDC	0V.	95VDC	75VAC	6VDC	
V 13	12AU7	120VDC	0V.	5.4VDC	18VAC	18VAC	24VDC	-.1VDC	.6VDC	24VAC
V 14	12SN7GT	0V.	82VDC	2.6VDC	-2.4VDC	20VDC 34VDC	2.6VDC	42VAC	30VAC	
V 15	6SL7GT	-3.5VDC	400VDC	0V.	-.9VDC	300VDC	0V.	48VAC	42VAC	
V 16	6AL5	.9VDC	-1.1VDC	12VAC	18VAC	0V.	.4VDC	0V.		
V 17	12SN7GT	-24VDC	125VDC	0V.	-24VDC	18VDC 90VDC	0V.	63VAC	75VAC	
V 18	25L6GT	-.1VDC	75VAC	125VDC	125VDC	-1.8VDC	0V.	100VAC	0V.	
V 19	25L6GT	0V.	75VAC	125VDC	110VDC	-33VDC	0V.	100VAC	0V.	
V 20	1B3GT	* DO NOT MEASURE								
V 21	7JP4	PIN 1	PIN 2	PIN 3	PIN 5	PIN 7	PIN 8	PIN 9	PIN 10	PIN 11	PIN 14
		0V.	45VDC 125VDC	-15VDC	*	*	*	*	*	*	6VAC

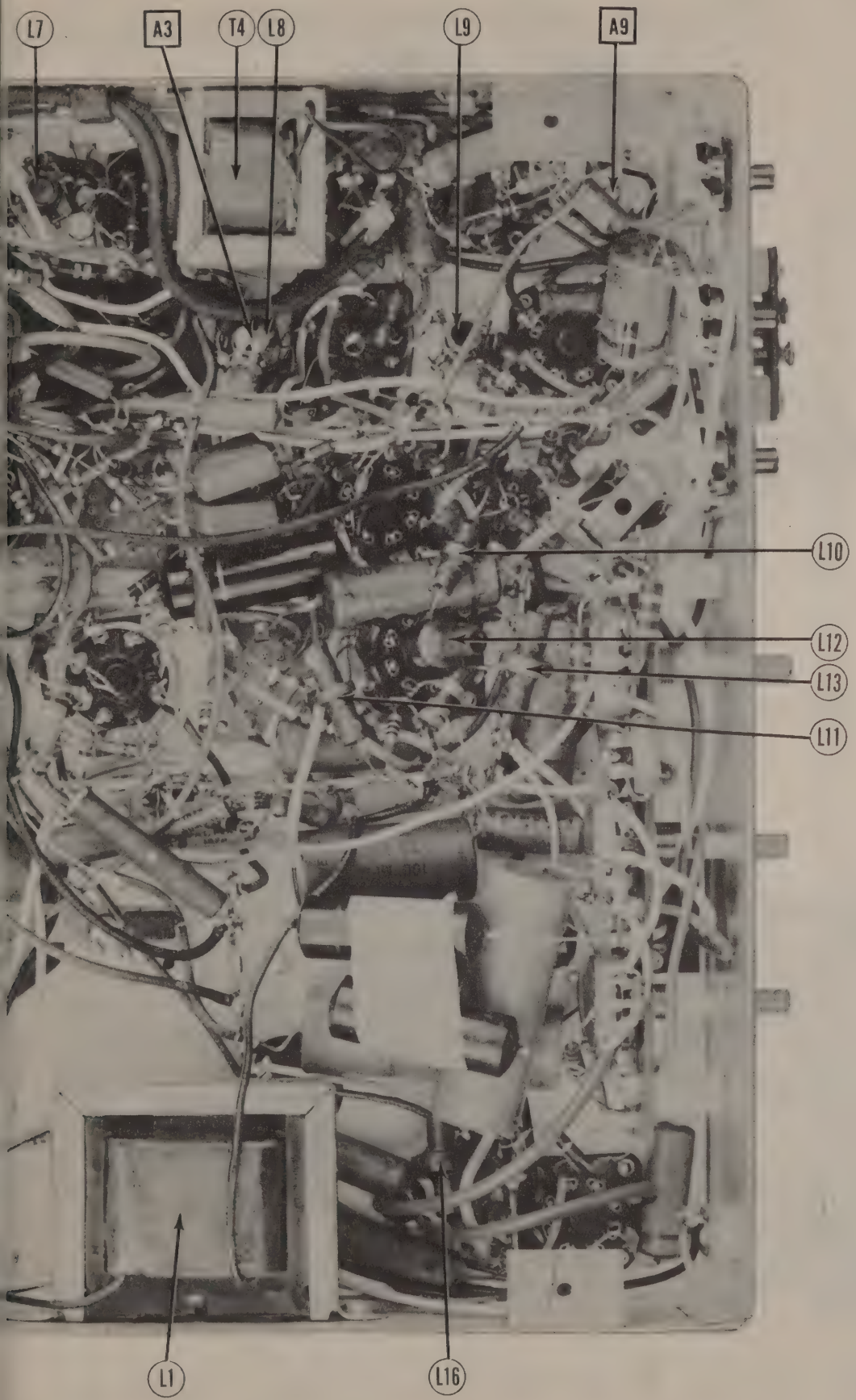
§ TAKEN WITH VACUUM TUBE VOLTMETER.
* DO NOT MEASURE.

RESISTANCE READINGS

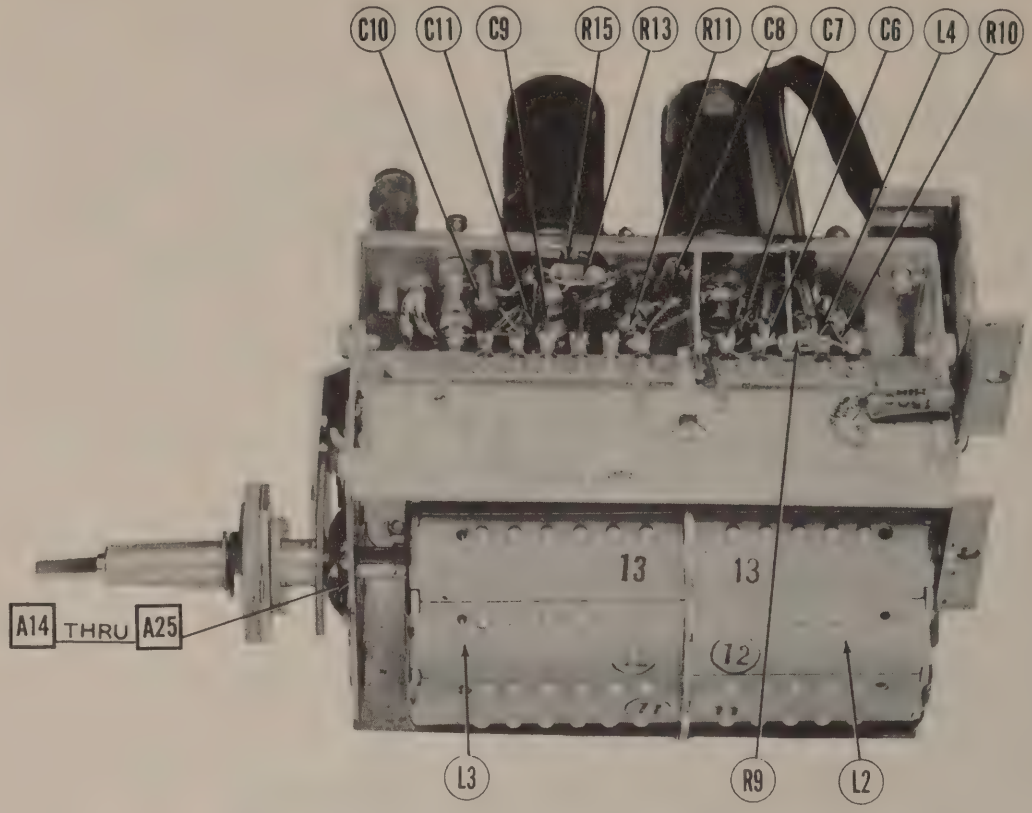
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	2 Meg.	0Ω	32Ω	36Ω	†2.2KΩ	†2.2KΩ	0Ω		
V 2	6J6	†4.7KΩ	†100ΩΩ	32Ω	34Ω	220KΩ	10KΩ	0Ω		
V 3										
V 4	6AU6	2 Meg.	550Ω	16Ω	13Ω	†500Ω	†500Ω	82Ω		
V 5	6AU6	470Ω	180Ω	11Ω	13Ω	†500Ω	†500Ω	180Ω		
V 6	6AU6	470Ω	180Ω	9Ω	11Ω	†500Ω	†500Ω	180Ω		
V 7	6AL5	470Ω	1Meg.	2Ω	5Ω	650Ω	Inf.	4KΩ		
V 8	12AU7	†3.2KΩ	4KΩ	5KΩ	5Ω	5Ω	†500KΩ	0Ω	180KΩ	8Ω
V 9	25L6GT	4KΩ	16Ω	†5.6KΩ	†1000Ω	1 Meg.	†1000Ω	25Ω	1.5KΩ	
V 10	6SH7	Inf.	10Ω	0Ω	100KΩ	0Ω	†15KΩ	13Ω	†15KΩ	
V 11	6S8GT	Inf.	0Ω	100KΩ	100KΩ	160KΩ	†470KΩ	5Ω	2Ω	TOP CAP 4.7Meg.
V 12	25L6GT	Inf.	21Ω	†1.2KΩ	†1000Ω	470KΩ	†1000Ω	28Ω	150Ω	
V 13	12AU7	†3.3KΩ	1 Meg	3.3KΩ	8Ω	8Ω	100KΩ	Inf.	1.5KΩ	10Ω
V 14	12SN7GT	100KΩ	†18KΩ	1000Ω	330KΩ	†5Meg. †1Meg.	1000Ω	19Ω	13Ω	
V 15	6SL7GT	22Meg.	♦23Meg.	0Ω	10Meg.	♦23Meg.	0Ω	21Ω	19Ω	
V 16	6AL5	Inf.	Inf.	5Ω	9Ω	22KΩ	Inf.	22KΩ		
V 17	12SN7GT	200KΩ	†1000Ω	0Ω	200KΩ	†500KΩ †47KΩ	0Ω	25Ω	28Ω	
V 18	25L6GT	Inf.	28Ω	†100Ω	†100Ω	2.2Meg.	Inf.	32Ω	0Ω	
V 19	25L6GT	Inf.	28Ω	†90Ω	†1.5KΩ	15KΩ	0Ω	32Ω	0Ω	
V 20	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP †700Ω
V 21	7JP4	PIN 1	PIN 2	PIN 3	PIN 5	PIN 7	PIN 8	PIN 9	PIN 10	PIN 11	PIN 14
		0Ω	90KΩ 50KΩ	1.5Meg.	♦12Meg.	♦4.7Meg.	♦6Meg.	♦100KΩ	♦6.5Meg.	♦6Meg.	2Ω

† MEASURED FROM OUTPUT OF M1.
♦ MEASURED FROM PIN 7 OF V20.

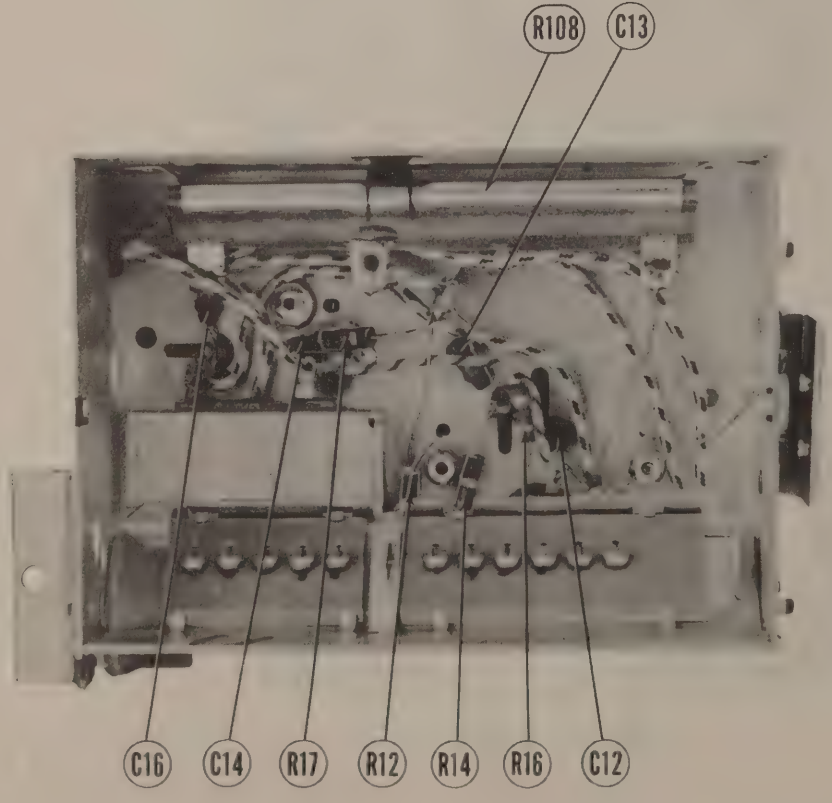
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



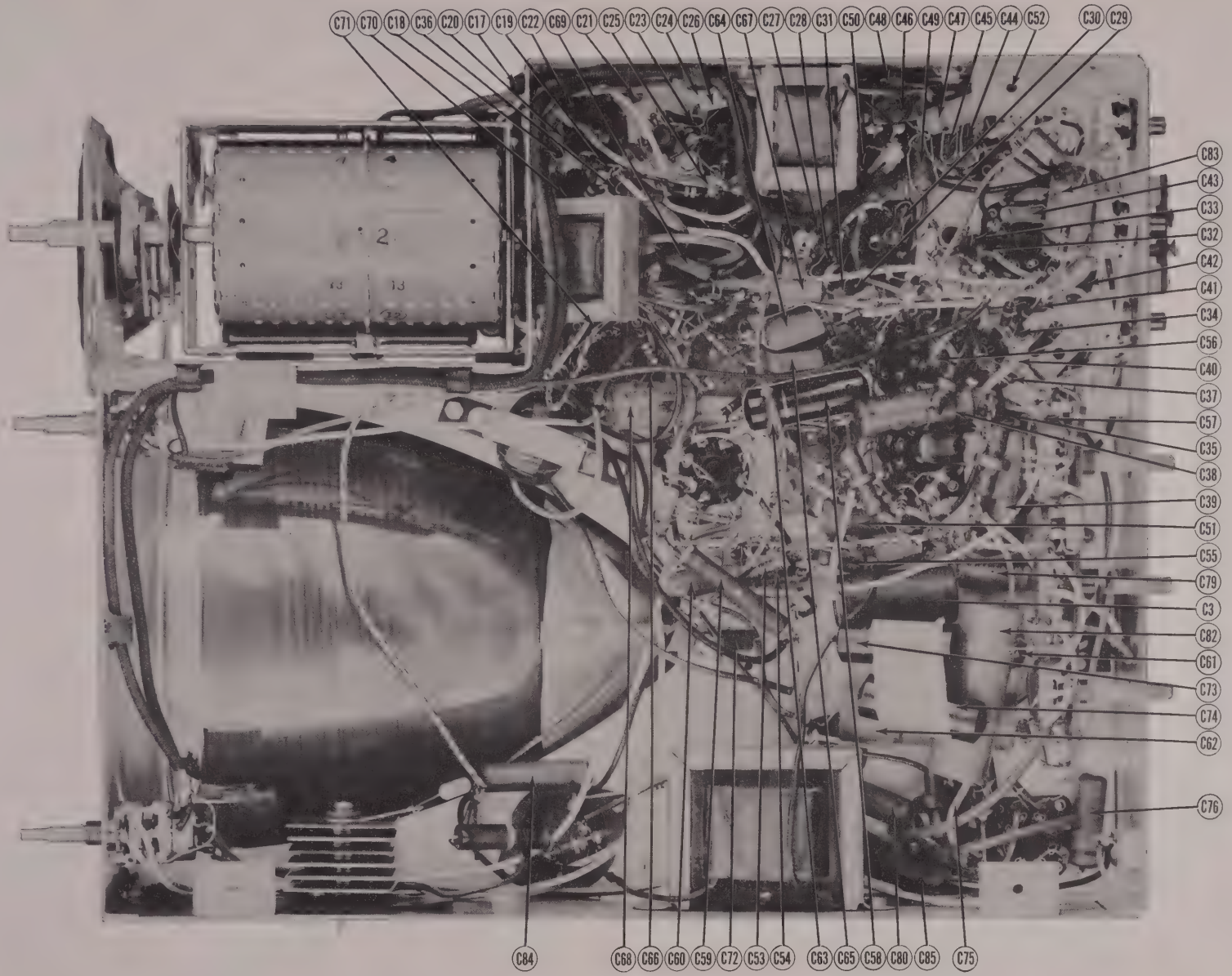
TOR AND ALIGNMENT IDENTIFICATION



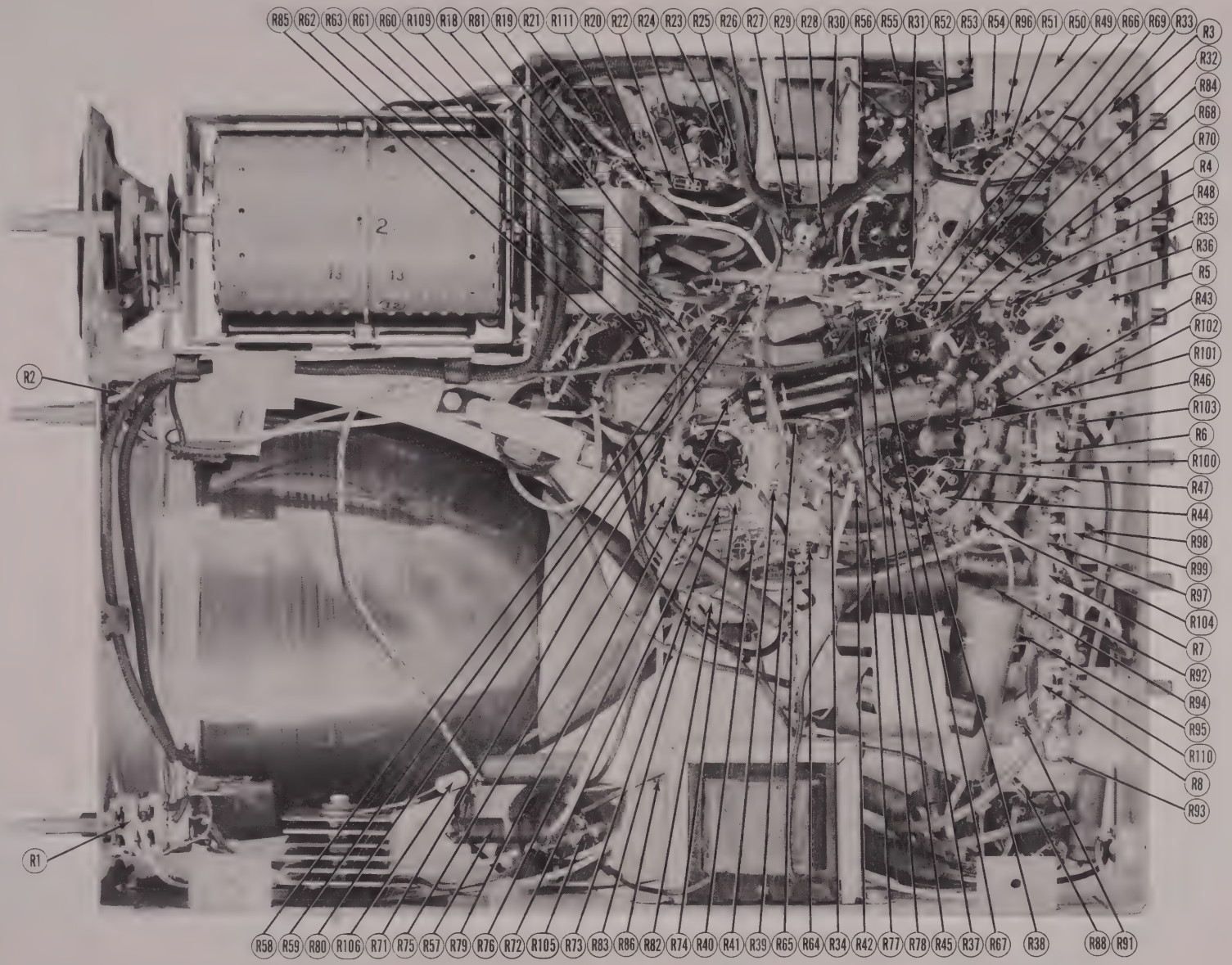
RF TUNER-RIGHT SIDE-STANDARD COIL



RF TUNER-BOTTOM VIEW-STANDARD COIL



CHASSIS BOTTOM VIEW–CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

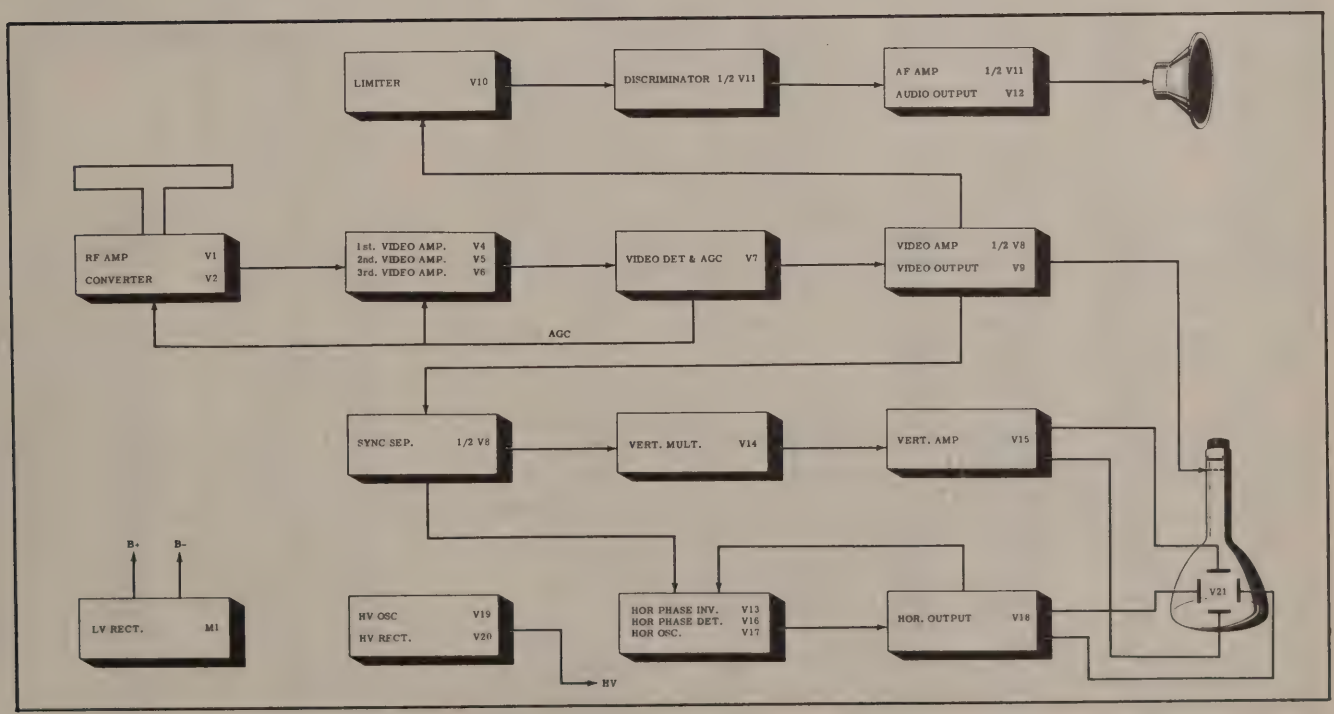
HIGH VOLTAGE ADJUSTMENT

Turn the brightness control to maximum counter-clockwise.

Connect a VTVM with high voltage multiplier probe between pin 9 of the picture tube socket and B-. Adjust the high voltage trimmer (B1) to read 6000 volts. The line voltage should be set at 117 volts for this adjustment.

DISASSEMBLY INSTRUCTIONS

1. Remove three push-on type control knobs.
2. Remove six phillips head screws holding rear cover. Remove cover.
3. Loosen two antenna terminal screws. Remove antenna lead in lugs.
4. Remove four phillips head screws holding chassis. Remove chassis.



BLOCK DIAGRAM

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1A	RF Amp.	800535	6AG5	7BD	Tuner 470470 (Standard Coil Tuner)
B	RF Amp.	800536	6J6	7BF	Tuner 470492 (GI Tuner)
V2A	Converter	800536	6J6	7BF	Tuner 470470 (Standard Coil Tuner)
B	Mixer	800536	6J6	7BF	Tuner 470492 (GI Tuner)
V3	Oscillator	800536	6J6	7BF	Tuner 470492 (GI Tuner)
V4	1st Video IF	800533	6AU6	7BK	
V5	2nd Video IF	800533	6AU6	7BK	
V6	3rd Video IF	800533	6AU6	7BK	
V7	Video Det. -AGC Rectifier	800541	6AL5	6BT	
V8	Video Amp. -Sync. Sep.	800026	12AU7	9A	
V9	Video Output	800490	25L6GT	7AC	
V10	Limiter	800420	6SH7	8BK	
V11	Disc. -AF Amp.	800015	6S8GT	8CB	
V12	Audio Output	800490	25L6GT	7AC	
V13	Hor. Phase Inv.	800026	12AU7	9A	
V14	Vert. Multivibrator	800039	12SN7GT	8BD	
V15	Vert. Amp.	800350	6SL7GT	8BD	
V16	Hor. Phase Det.	800541	6AL5	6BT	
V17	Hor. Osc.	800039	12SN7GT	8BD	
V18	Hor. Output	800490	25L6GT	7AC	
V19	HV Osc.	800490	25L6GT	7AC	
V20	HV Rectifier	800450	1B3GT	3C	
V21	Picture Tube	810008	7JP4	14G	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	120	150	925154	AFH2430D	UP9BJ1038			● Filter
B	150	150						▲ Filter
C2A	80	150	925153	AFH24168D				● Filter
B	120	150						■ Filter
C	40	150						▲ Decoupling
C3	100	25	925156					V. Output Cathode Bypass
C4	1500		928006	1467-0015	IW5D15	GP2L-0015		Ant. Coupling
C5	1500		928006	1467-0015	IW5D15	GP2L-0015		Ant. Coupling
C6	5					NPOK-5		Fixed Trimmer
C7	1000						29C4	RF Fil. Bypass
C8	120					GP2K-120		RF Decoupling
C9	100					GP1K-100		RF Coupling
C10	10					N750K-10		Fixed Trimmer
C11	20					NPOK-20		Osc. Grid Cap.
C12	1000					GP2L-001	29C4	Conv. Filament Bypass
C13	1000					GP2L-001		RF Bypass
C14	1000					GP2L-001		Conv. Plate Decoupling
C15	5					NPOK-5		Fixed Trimmer
C16	1000					GP2L-001	29C4	Filament Bypass
C17	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	RF Bypass
C18	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	AGC Filter
C19	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	RF Bypass
C20	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	1st V. IF Supp. Bypass
C21	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	1st V. IF Decoupling
C22	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	1st V. IF Fil. Bypass
C23	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	2nd V. IF Grid Filter
C24	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	2nd V. IF Cath. Bypass
C25	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	2nd V. IF Decoupling
C26	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	2nd V. IF Fil. Bypass
C27	62							Fixed Trimmer
C28	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	3rd V. IF Grid Filter
C29	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	3rd V. IF Cath. Bypass
C30	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	3rd V. IF Fil. Bypass
C31	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C32	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	V. Diode Filter
C33	5		928039	1468-000005	5W5V5	NPOK-5	MS-55	V. Diode Filter
C34	10		928002	1468-00001	5W5Q1	GP1K-10	MS-41	IF Coupling
C35	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	AGC Filter
C36	.1	200	920573	P288-1	GT2P1		TM-1	AGC Filter
C37	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	V. Det. -AGC Fil. Bypass
C38	.1	400	923064	P488-1	GT4P1		TM-1	Video Coupling
C39	.1	400	923064	P488-1	GT4P1		TM-1	Video Coupling
C40	4.7		923004	1468-000005	5W5V5	NPOK-4.7	MS-55	S. IF Coupling
C41	100		928106	1468-0001	5W5T1	GP1K-100	1FM-31	S. IF Coupling
C42	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	RF Bypass
C43	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	Limiter Decoupling
C44	100	500	928013	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass
C45	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	RF Bypass
C46	1000	500	928003	1468-001	IW5D1	GP2L-001	1FM-21	De-emphasis
C47	.002	600	923088	P688-002	GT6D2	GP2M-002	TM-22	Audio Coupling
C48	220		928011	1468-00025	5W5T25	GP2K-220	1FM-325	AF Amp. Plate Bypass
C49	.01	400	923061	P488-01	GT4S1	GP2-335-01	TM-11	Audio Coupling
C50	.01	400	923061	P488-01	GT4S1	GP2-335-01	TM-11	Output Plate Bypass
C51	.1	400	923064	P488-1	GT4P1		TM-1	Sync. Coupling
C52	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	RF Bypass
C53	.005	200	920576	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C54	.005	200	920576	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C55	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	Vert. Sync. Coupling
C56	.008	400	923087					Vert. MV Feedback
C57	.1	200	923067	P288-1	GT2P1		TM-1	Vert. Discharge
C58	.1	600	923064	P688-1	GT6P1		TM-1	Vert. Sweep Coupling
C59	100	3000	928041					Vert. Sweep Coupling
C60	.005	200	923069	P688-005	GT6D5	GP2M-005	TM-25	Voltage Divider
C61	.0047	6000	920504		PTE60D5		TVM-256	Vert. Sweep Coupling
C62	.005	6000	920504	6089M-005	PTE60D5		TVM-256	Vert. Sweep Coupling

CAPACIT

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMEN: EMERSON PART No.	REPLACEMEN: AEROVOX PART No.	REPLACEMEN: COR DUB PAR
C63	1500		928006	1467-0015	IW5D
C64	1000	500	910211	1467-001	IW5D
C65	1000	500	910211	1467-001	IW5D
C66	1500		928006	1467-0015	IW5D
C67	.01	200	920570	P488-01	GT2S
C68	.25	200	920575	P488-25	GT2S
C69	820	500	910037		
C70	1000	500	910140	1468-001	IW5D
C71	1500		928006	1467-0015	IW5D
C72	10	500	928002	1468-00001	5W5C
C73	.001	6000	920503		PTE
C74	.001	6000	920503		PTE
C75	.05	200	923068	P288-05	GT2S
C76	.05	200	923068	P288-05	GT2S
C77	1500		928006	1467-0015	IW5D
C78	2200	500	915000		
C79	.1	200	923067	P288-1	GT2I
C80	.05	400	923062	P488-05	GT4S
C81	.0005	6000	920505		PTE
C82	.005	6000	920504	6089M-005	PTE
C83	.25	200	920575	P488-25	GT2I
C84	.05	400	923062	P488-05	GT4S
C85	.05	400	923062	P488-05	GT4S

CO

ITEM No.	RATING: RESIST-ANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: IRC PART No.	CLA PA
R1A	5000Ω		390086		3900
B	1 Meg.				
R2A	50KΩ			B11-123 *	
B	1 Meg.		390087	B11-137 *	3900
C	Shaft End			E187 *	
R3A	100KΩ		390088	Q11-128	AM-
B	Shaft		Not Req.	RQ	KSS-
R4A	500KΩ		390089	Q11-133	AM-
B	Shaft		Not Req.	RQ	KSS-
R5A	5 Meg.		390091	Q11-141	AM-
B	Shaft		Not Req.	RQ	KSS-
R6	4 Meg.		390092		3900
R7	5 Meg.		390093		3900
R8	5 Meg.		390093		3900

* Additional parts to be used with "Concentrikit".
†† File slot in shaft to duplicate original.

RE

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: IRC PART No.
R9	3900Ω 20%			BTS-3900
R10	47KΩ 20%			BTS-47K
R11	10KΩ 20%			BTS-10K
R12	2200Ω 20%			BTS-2200
R13	4700Ω			BTS-4700
R14	220KΩ 20%			BTS-220K
R15	10KΩ 20%			BTS-10K
R16	4700Ω			BTS-4700
R17	1000Ω			BTS-1000
R18	470Ω 20%		350412	BTS-470
R19	5600Ω		340672	BTS-5600
R20	82Ω		340232	
R21	470Ω 20Ω		350412	BTS-470
R22	470Ω 20%		350412	BTS-470
R23	22KΩ		340812	
R24	470Ω 20%		350412	BTS-470
R25	180Ω		340312	
R26	470Ω 20%		350412	BTS-470
R27	10KΩ		340732	
R28	10KΩ		340732	
R29	470Ω 20%		350412	BTS-470
R30	180Ω		340312	
R31	470Ω 20%		350412	BTS-470
R32	470Ω 20%		350412	BTS-470
R33	470Ω 20%		350412	BTS-470
R34	3900Ω		340632	BTS-3900
R35	1 Meg. 20%		351212	BTS-1 Meg
R36	1 Meg. 20%		351212	BTS-1 Meg
R37	2200Ω		340572	BTS-2200
R38	1000Ω		340492	BTS-1000
R39	180KΩ		341032	BTS-180K
R40	2200Ω		340572	BTS-2200
R41	47KΩ		340892	BTS-47K
R42	560KΩ		341152	BTS-560K
R43	2200Ω 20%		350572	BTS-2200
R44	1 Meg. 20%		351212	BTS-1 Meg
R45	1500Ω		340532	BTS-1500
R46	10KΩ		340732	BTS-10K
R47	5600Ω		370672	BTA-5600
R48	100KΩ		340972	
R49	15KΩ		350772	BTS-15K
R50	100KΩ		340972	BTS-100K
R51	100KΩ		340972	BTS-100K
R52	68KΩ 20%		350932	BTS-68K

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1A	RF Amp.	800535	6AG5	7BD	Tuner 470470 (Standard Coil Tuner)
B	RF Amp.	800536	6J6	7BF	Tuner 470492 (GI Tuner)
V2A	Converter	800536	6J6	7BF	Tuner 470470 (Standard Coil Tuner)
B	Mixer	800536	6J6	7BF	Tuner 470492 (GI Tuner)
V3	Oscillator	800536	6J6	7BF	Tuner 470492 (GI Tuner)
V4	1st Video IF	800533	6AU6	7BK	
V5	2nd Video IF	800533	6AU6	7BK	
V6	3rd Video IF	800533	6AU6	7BK	
V7	Video Det. -AGC Rectifier	800541	6AL5	6BT	
V8	Video Amp. -Sync Sep	800026	12AU7	9A	
V9	Video Output	800490	25L6GT	7AC	
V10	Limiter	800420	6SH7	8BK	
V11	Disc -AF Amp	800015	6S8GT	8CB	
V12	Audio Output	800490	25L6GT	7AC	
V13	Hor Phase Inv	800026	12AU7	9A	
V14	Vert. Multivibrator	800039	12SN7GT	8BD	
V15	Vert Amp.	800350	6SL7GT	8BD	
V16	Hor. Phase Det.	800541	6AL5	6BT	
V17	Hor Osc	800039	12SN7GT	8BD	
V18	Hor Output	800490	25L6GT	7AC	
V19	HV Osc	800490	25L6GT	7AC	
V20	HV Rectifier	800450	1B3GT	3C	
V21	Picture Tube	810008	7JP4	14G	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	130	150	925154	AFH2430D	UP9BJ1638			● Filter
B	150	150						▲ Filter
C2A	80	150	925153	AFH2416BD				● Filter
B	130	150						■ Filter
C	40	150						▲ Decoupling
C3	100	25	925156					V. Output Cathode Bypass
C4	1500		928006	1467-0015	IW5D15	GP2L-0015		Ant. Coupling
C5	1500		928006	1467-0015	IW5D15	GP2L-0015		Ant. Coupling
C6	5					NPOK-5		Fixed Trimmer
C7	1000						29C4	RF Fil. Bypass
C8	130					GP2K-120		RF Decoupling
C9	100					GP1K-100		RF Coupling
C10	10					N750K-10		Fixed Trimmer
C11	20					NPOK-20		Osc. Grid Cap.
C12	1000					GP2L-001	29C4	Conv. Filament Bypass
C13	1000					GP2L-001		RF Bypass
C14	1000					GP2L-001		Conv. Plate Decoupling
C15	5					NPOK-5		Fixed Trimmer
C16	1000					GP2L-001	29C4	Filament Bypass
C17	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	RF Bypass
C18	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	AGC Filter
C19	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	RF Bypass
C20	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	1st V. IF Supp. Bypass
C21	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	1st V. IF Decoupling
C22	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	1st V. IF Fil. Bypass
C23	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	2nd V. IF Grid Filter
C24	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	2nd V. IF Cath. Bypass
C25	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	2nd V. IF Decoupling
C26	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	2nd V. IF Fil. Bypass
C27	82							Fixed Trimmer
C28	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	3rd V. IF Grid Filter
C29	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	3rd V. IF Cath. Bypass
C30	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	3rd V. IF Fil. Bypass
C31	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	3rd V. IF Decoupling
C32	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	V. Diode Filter
C33	5		928039	1468-000005	5W5V5	NPOK-5	MS-55	V. Diode Filter
C34	10		928003	1468-00001	5W5Q1	GP1K-10	MS-41	IF Coupling
C35	1500		928306	1467-0015	IW5D15	GP2L-0015	IFM-215	AGC Filter
C36	.1	200	920573	P288-1	GT2P1		TM-1	AGC Filter
C37	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	V. Det.-AGC Fil. Bypass
C38	.1	400	923064	P488-1	GT4P1		TM-1	Video Coupling
C39	.1	400	923064	P488-1	GT4P1		TM-1	Video Coupling
C40	4.7		923004	1468-000005	5W5V5	NPOK-4.7	MS-55	S. IF Coupling
C41	100		928106	1468-0001	5W5T1	GP1K-100	IFM-31	S. IF Coupling
C42	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	RF Bypass
C43	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	Limiter Decoupling
C44	100	500	928013	1468-0001	5W5T1	GP1K-100	IFM-31	RF Bypass
C45	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	RF Bypass
C46	1000	500	928003	1468-001	IW5D1	GP2L-001	IFM-21	De-emphasis
C47	.002	600	923088	P688-002	GT6D2	GP2M-002	TM-22	Audio Coupling
C48	220		928011	1468-00025	5W5T2S	GP2K-220	IFM-325	AF Amp. Plate Bypass
C49	.01	400	923081	P488-01	GT4S1	GP2-335-01	TM-11	Audio Coupling
C50	.01	400	923081	P488-01	GT4S1	GP2-335-01	TM-11	Output Plate Bypass
C51	.1	400	923064	P488-1	GT4P1		TM-1	Sync. Coupling
C52	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	RF Bypass
C53	.005	200	920576	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C54	.005	200	920576	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C55	1500		928006	1467-0015	IW5D15	GP2L-0015	IFM-215	Vert. Sync. Coupling
C56	.008	400	923087					Vert. MV Feedback
C57	.1	200	923087	P288-1	GT2P1		TM-1	Vert. Discharge
C58	.1	600	923064	P688-1	GT6P1		TM-1	Vert. Sweep Coupling
C59	100	3000	928041					Vert. Sweep Coupling
C60	.005	200	923089	P888-005	GT6D5	GP2M-005	TM-25	Voltage Divider
C61	.0047	6000	920504		PTE60D5		TVM-256	Vert. Sweep Coupling
C62	.006	6000	920504	6089M-005	PTE60D5		TVM-256	Vert. Sweep Coupling

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C63	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	Hor. Sync. Coupling
C64	1000	500	910311	1467-001	IW5D1	GP2L-001	1FM-21	Hor. Sync. Coupling
C65	1000	500	910311	1467-001	IW5D1	GP2L-001	1FM-21	Hor. Sync. Coupling
C66	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	Hor. Feedback
C67	.01	200	920570	P488-01	GT2S1	GP2-335-01	TM-11	AFC Filter
C68	.25	200	920575	P488-25	GT2P25		TC-2	AFC Feedback
C69	820	500	910037					Hor. Osc. Grid Cap.
C70	1000	500	910140	1468-001	IW5D1	GP2L-001	1FM-21	Hor. Discharge
C71	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	Hor. Sweep Coupling
C72	10	500	928002	1468-00001	5W5Q1	GP1K-10	MS-41	Hor. Feedback
C73	.001	6000	920503		PTE60D1		TVM-216	Hor. Sweep Coupling
C74	.001	6000	920503		PTE60D1		TVM-216	Hor. Sweep Coupling
C75	.05	200	923086	P288-05	GT2S5		TM-15	HV Osc. Decoupling
C76	.05	200	923086	P288-05	GT2S5		TM-15	HV Osc. Screen Bypass
C77	1500		928006	1467-0015	IW5D15	GP2L-0015	1FM-215	HV Osc. Grid Cap.
C78	2200	500	915000					Fixed Trimmer
C79	.1	200	923067	P288-1	GT2P1		TM-1	Bias Filter
C80	.05	400	923062	P488-05	GT4S5		TM-15	HV Chassis Isolation
C81	.0005	6000	920505		PTE60T5		TVM-356	HV Filter
C82	.005	6000	920504	6089M-005	PTE60D5		TVM-356	HV Filter
C83	.25	200	920575	P488-25	GT2P25		TC-2	Picture Tube Cath. Dec.
C84	.05	400	923062	P488-05	GT4S5		TM-15	Line Filter
C85	.05	400	923062	P488-05	GT4S5		TM-15	Line Filter

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500Ω	½	390086		390086	Contrast control
B	1 Meg.	½				Volume control and switch
R2A	50KΩ	½		B11-123 *		Horiz. hold control, front
B	1 Meg.	½	390087	B11-137 *	390087	Vert. hold control, rear
C	Shaft End			E187 *		Attach per instructions in "Concentrikit".
R3A	100KΩ	½	390088	QU-128	AM-49-S	Brightness control
B	Shaft		Not Req.	RQ	KSS-3 ††	Attach to R3A per instructions
R4A	500KΩ	½	390089	QU-133	AM-58-S	Horiz. size control
B	Shaft		Not Req.	RQ	KSS-3 ††	Attach to R4A per instructions
R5A	5 Meg.	½	390091	QU-141	AM-85-S	Vert. size control
B	Shaft		Not Req.	RQ	KSS-3 ††	Attach to R5A per instructions
R6	4 Meg.	½	390092		390092	Focus control
R7	5 Meg.	½	390093		390093	Horiz. centering control, tapped at 2.5 Meg.
R8	5 Meg.	½	390093		390093	Vert. centering control, tapped at 2.5 Meg.

* Additional parts to be used with "Concentrikit".
†† File slot in shaft to duplicate original.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R9	3900Ω 20%	½		BTS-3900	RF Grid
R10	47KΩ 20%	½		BTS-47K	AGC Network
R11	10KΩ 20%	½		BTS-10K	RF Plate Coil Shunt
R12	2200Ω 20%	½		BTS-2200	RF Decoupling
R13	4700Ω	½		BTS-4700	Conv. Grid
R14	220KΩ 20%	½		BTS-220K	Conv. Grid
R15	10KΩ 20%	½		BTS-10K	Osc. Grid
R16	4700Ω	½		BTS-4700	Osc. Plate
R17	1000Ω	½		BTS-1000	Conv. Plate Decoupling
R18	470Ω 20%	½	350412	BTS-470	AGC Network
R19	5600Ω	½	340572	BTS-5600	1st Video IF Transformer Shunt See Note 1
R20	82Ω	½	340232		1st Video IF Cathode
R21	470Ω 20%	½	350412	BTS-470	1st Video IF Suppressor Grid
R22	470Ω 20%	½	350412	BTS-470	1st Video IF Decoupling
R23	22KΩ	½	340812		2nd Video IF Transformer Shunt
R24	470Ω 20%	½	350412	BTS-470	2nd Video IF Grid
R25	180Ω	½	340312		2nd Video IF Cathode
R26	470Ω 20%	½	350412	BTS-470	2nd Video IF Decoupling
R27	10KΩ	½	340732		3rd Video IF Transformer Shunt
R28	10KΩ	½	340732		3rd Video IF Transformer Shunt See Note 2
R29	470Ω 20%	½	350412	BTS-470	3rd Video IF Grid
R30	180Ω	½	340312		3rd Video IF Cathode
R31	470Ω 20%	½	350412	BTS-470	3rd Video IF Decoupling
R32	470Ω 20%	½	350412	BTS-470	Voltage Divider
R33	470Ω 20%	½	350412	BTS-470	Video Det. Diode Load
R34	3900Ω	½	340632	BTS-3900	Video Det. Diode Load
R35	1 Meg. 20%	½	351212	BTS-1 Meg.	AGC Network
R36	1 Meg. 20%	½	351212	BTS-1 Meg.	AGC Rect. Diode Load
R37	2200Ω	½	340572	BTS-2200	Video Amp. Plate
R38	1000Ω	½	340492	BTS-1000	Video Amp. Plate Decoupling
R39	180KΩ	½	341032	BTS-180K	Sync. Sep. Cathode
R40	2200Ω	½	340572	BTS-2200	Voltage Divider
R41	47KΩ	½	340892	BTS-47K	Voltage Divider
R42	560KΩ	½	341152	BTS-560K	Sync. Sep. Plate
R43	2200Ω 20%	½	350572	BTS-2200	Isolation
R44	1 Meg. 20%	½	351212	BTS-1 Meg.	Video Output Grid
R45	1500Ω	½	340532	BTS-1500	Video Output Cathode
R46	10KΩ	½	340732	BTS-10K	Peaking Coil Shunt
R47	5600Ω	1	370672	BTA-5600	Video Output Plate
R48	100KΩ	½	340972		Limiter Grid
R49	15KΩ	½	350772	BTS-15K	Limiter Decoupling
R50	100KΩ	½	340972	BTS-100K	Ratio Det. Diode Load
R51	100KΩ	½	340972	BTS-100K	Ratio Det. Diode Load
R52	68KΩ 20%	½	350932	BTS-68K	De-emphasis

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R53	4.7Meg. 20%	½	351372	BTS-4.7 Meg.	AF Grid
R54	470KΩ 20%	½	351132	BTS-470K	Output Grid
R55	470KΩ 20%	½	351132	BTS-470K	Output Grid
R56	150Ω	1	370292	BW-1-150	Output Cathode
R57	1000Ω	2	397080	BW-2-1000	Filter
R58	1 Meg. 20%	½	351212	BTS-1 Meg.	Hor. Phase Inv. Grid
R59	3300Ω	½	340612	BTS-3300	Hor. Phase Inv. Cathode
R60	3300Ω	½	340612	BTS-3300	Hor. Phase Inv. Plate
R61	1500Ω	½	340532	BTS-1500	Hor. Phase Inv. Cathode
R62	47KΩ	½	340892	BTS-47K	Feedback
R63	100KΩ 5%	½	330972	BTS-100K-5%	Voltage Divider
R64	8200Ω	½	340712	BTS-8200	Integrator
R65	8200Ω	½	340712	BTS-8200	Integrator
R66	100KΩ	½	340972	BTS-100K	Vert. MV Grid
R67	1000Ω	½	340492	BTS-1000	Vert. MV Cathode
R68	330KΩ	½	341092	BTS-330K	Vert. MV Grid
R69	18KΩ	½	340792	BTS-18K	Vert. MV Plate
R70	1 Meg.	½	341212	BTS-1 Meg.	Vert. MV Plate
R71	22 Meg. 20%	½	351532	BTS-22 Meg.	Voltage Divider
R72	22 Meg. 20%	½	351532	BTS-22 Meg.	Vert. Amp. Grid
R73	10 Meg. 20%	½	351452	BTS-10 Meg.	Vert. Amp. Grid
R74	10 Meg.	1	371452	BTA-10 Meg.	Vert. Amp. Plate
R75	10 Meg.	1	371452	BTA-10 Meg.	Vert. Amp. Plate
R76	100KΩ	½	340972	BTS-100K	Voltage Divider
R77	100KΩ 5%	½	330972	BTS-100K-5%	Horiz. Phase Det. Load
R78	100KΩ 5%	½	330972	BTS-100K-5%	Horiz. Phase Det. Load
R79	22KΩ	½	340812	BTS-22K	Feedback Network
R80	560KΩ	½	341152	BTS-560K	Feedback Network
R81	47KΩ	½	340892	BTS-47K	Horiz. Osc. Grid
R82	3.9 Meg.	½	341352	BTS-3.9 Meg.	Feedback
R83	3.3 Meg. 20%	½	351332	BTS-3.3 Meg.	Feedback
R84	47KΩ	½	350892	BTS-47K	Horiz. Osc. Plate
R85	2.2 Meg.	½	351292	BTS-2.2 Meg.	Horiz. Output Grid
R86	220KΩ	½	351052	BTS-220K	Isolation
R87	15KΩ	½	340772	BTS-15K	HV Osc. Grid
R88	1500Ω	½	340532	BTS-1500	HV Osc. Screen
R89	470KΩ 2%	½	351132	BTS-470K	Voltage Divider
R90	100KΩ	½	340972		HV Filter
R91	5.6 Meg.	½		BTS-5.6 Meg.	Vert. Deflection Load See Note 3
R92	4.7 Meg.	½	341372	BTS-4.7 Meg.	Horiz. Deflection Load
R93	4.7 Meg.	½	341372	BTS-4.7 Meg.	Horiz. Deflection Load
R94	4.7 Meg.	½	341372	BTS-4.7 Meg.	Vert. Deflection Load
R95	1 Meg.	½	341212	BTS-1 Meg.	Vert. Deflection Load See Note 4
R96	47KΩ 20%	½	340892	BTS-47K	Voltage Divider
R97	1.8 Meg.	1	371272		Voltage Divider
R98	1.8 Meg.	1	371272		Voltage Divider
R99	1.8 Meg.	1	371272		Voltage Divider
R100	1.8 Meg.	1	371272		Voltage Divider
R101	1.8 Meg.	1	371272		Voltage Divider
R102	1.8 Meg.	1	371272		Voltage Divider
R103	1.8 Meg.	1	371272		Voltage Divider
R104	1 Meg.	½	351212	BTS-1 Meg.	Picture Tube Grid
R105	75Ω 5%	1	330222		Filter
R106	2.5Ω	½	394087		Surge Limiter-Wire Wound
R107	10Ω	5		AB-10	Filament Dropping-Wire Wound
R108A	20Ω	10		AB-20	RF Filament Shunt-Wire Wound
B	40Ω	10		AB-40	RF Filament Shunt-Wire Wound
R109	1500Ω	½	340532	BTS-1500	Horiz. Peaking
R110	2.2 Meg.	½	351292	BTS-2.2 Meg.	Voltage Divider
R111	3.3Ω	½		BW-½-3.3	Bias Network-Wire Wound, See Note 4

Note 1. Some models use 10KΩ resistor in this application.
Note 2. Some models use 22KΩ resistor in this application
Note 3. Some models use 4.7 Meg. resistor in this application.
Note 4. Not used in all models.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	NOTES
T1	1.3Ω	3.2Ω	738022	A-8110	A-3002		Hor. Block Osc. Trans.
T2	255Ω Tap. at 141Ω and 107Ω		738021				Hor. Output Trans.

TRANSFORMER (H.V. OSC.)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.
T3	1.5Ω	630Ω	36Ω	0Ω	738019			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: EMERSON PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	INSTALLATION NOTES
T4	2.6KΩ	3.5Ω	172Ω	.5Ω	734052	A-3876	A-2928	RO-2	

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	EMERSON PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	3.5Ω	480065	ST-113 ① MOD. P4-X	4A07	① Drill and tap magnet frame.
	CONE DIA.	V. C. DIA.				
SP2	3 7/8"	9/16"				

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	EMERSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.099A	62Ω	3.3 Henries	737012	C-2304 ②	C-2974 ②	TR-4200 ②	②Drill one new mounting hole.

COILS (RF-IF)

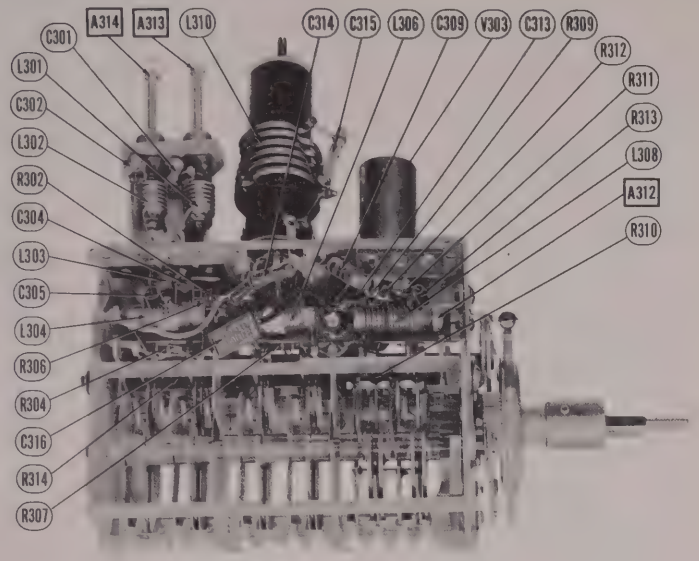
ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	EMERSON PART No.	MEISSNER PART No.	
L2	Ant. Coils	0Ω				Part of tuner.
L3	RF Mixer Grid and Osc. Coils	0Ω				Part of tuner.
L4	Fil. Choke	0Ω				Part of tuner.
L5A	Conv. Trans.	0Ω	0Ω	720107		Used in M2A
B	Conv. Trans.			720104		Used in M2B
L6	1st Video IF	.2Ω	.2Ω	720096		
L7	2nd Video IF	.2Ω	.2Ω	720098		
L8	3rd Video IF	.2Ω	.2Ω	720106		
L9	4th Video IF	.2Ω	.2Ω	720097		
L10	Peaking	5Ω		708090		80 microhenries, gray dot
L11	Peaking	6Ω		708090		80 microhenries, gray dot
L12	Peaking	10Ω		708095		180 microhenries
L13	Peaking	22Ω		708111		800 microhenries, orange dot
L14	Sound IF	2Ω		720103		
L15A	Disc. Trans.	2Ω	2Ω	708017		
B	Disc. Trans.			708018		
L16	RF Choke	9Ω		701515		1 millihenry

SELENIUM RECTIFIER

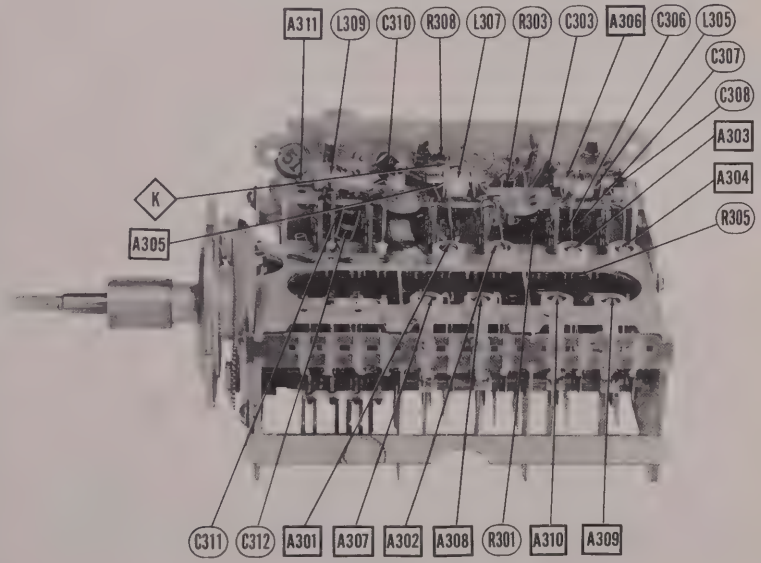
ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	EMERSON PART No.	SYLVANIA PART No.		
M1	.210A	817013	NF-5		

MISCELLANEOUS

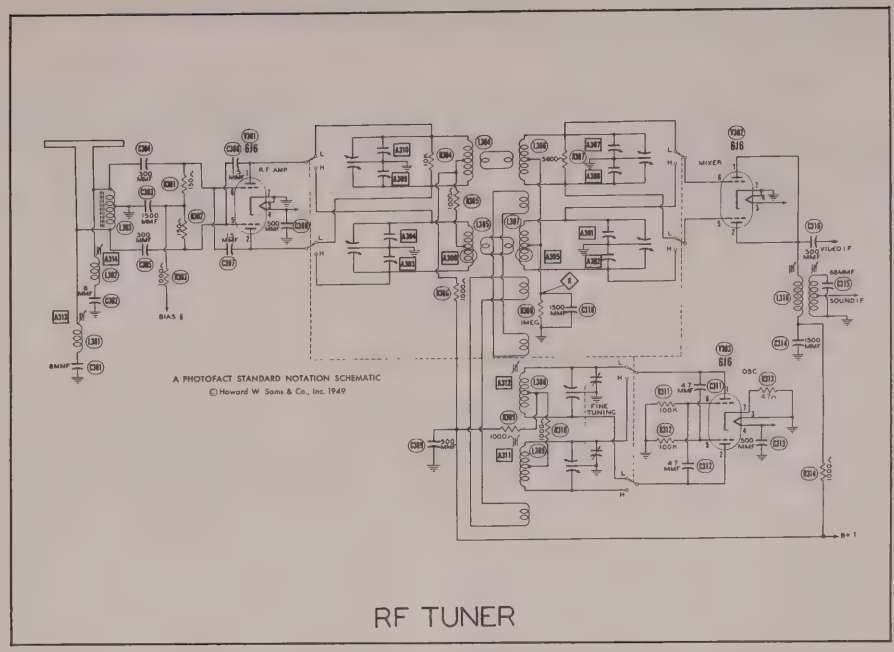
ITEM No.	PART NAME	EMERSON PART No.	NOTES
M2A	RF Tuner	470470	Standard Coil
B	RF Tuner	470492	General Instrument
	Socket	583206	Interlock with Line Cord
	Socket	585041	Picture Tube Socket and Cable Assy.
	Trimmer	900056	Hor. Osc. Adj. (400-2200MMF)



RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE



RF TUNER

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	
V301	RF Amp.	6J6	7BF	
V302	Mixer	6J6	7BF	
V303	Oscillator	6J6	7BF	

CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT	IDENTIFICATION
C301	8		Fixed Trimmer
C302	8		Fixed Trimmer
C303	1500		Bias Filter
C304	300		RF Coupling
C305	300		RF Coupling
C306	1.5		Neutralizing
C307	1.5		Neutralizing
C308	500		Filament Bypass
C309	500		RF Bypass
C310	1500		Mixer Grid Filter
C311	4.7		Osc. Feedback
C312	4.7		Osc. Feedback
C313	500		Filament Bypass
C314	1500		Mixer Decoupling
C315	68		Fixed Trimmer
C316	300		IF Coupling

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	IDENTIFICATION
R301	150Ω	½	RF Grid
R302	150Ω	½	RF Grid
R303	10000Ω	½	Bias Filter
R304	10KΩ	½	RF Coil Shunt
R305	10000Ω	½	RF Plate
R306	10000Ω	½	RF Plate
R307	56000Ω	½	Mixer Coil Shunt
R308	1 Meg	½	Mixer Grid
R309	10000Ω	½	Osc. Plate
R310	10000Ω	½	Osc. Plate
R311	100KΩ	½	Osc. Grid
R312	100KΩ	½	Osc. Grid
R313	47Ω	½	Osc. Cathode
R314	10000Ω	½	Mixer Decoup.

COILS

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	
L301	Interference Trap	0Ω		
L302	Interference Trap	0Ω		
L303	Ant. Input	0Ω		
L304	RF Low Band	0Ω		
L305	RF High Band	0Ω		
L306	Mixer Low Band	0Ω		
L307	Mixer High Band	0Ω		
L308	Osc. Low Band	0Ω		
L309	Osc. High Band	0Ω		
L310	IF Trans.	.22	0Ω	

OLDSMOBILE
MODEL 982421

OLDSMOBILE
MODEL 982421

TRADE NAME	Oldsmobile Model 982421
MANUFACTURER	Oldsmobile Motors, Div. of General Motors Corp., Lansing, Michigan
TYPE SET	Battery Operated Custom Built Superheterodyne Automotive Receiver
TUBES	Types 6SK7 or 7A7 RF Amp., 6SA7 or 7Q7 Converter, 6SK7 or 7A7 IF Amp., 6SR7 or 7E6 DET-AVC-AF Amp., (2) 6V6GT or (2) 7C5 Power Output, 0Z4 Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 7.2 Amp. at 6 Volts DC
TUNING RANGE—BROADCAST	550-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 8 (Grid) of 6SA7 (V2A) Note: 7Q7 (V2B) in sets with serial No. below 38500. Low side to chassis.	260KC (400 ~ Mod.)	Turn tuning gang to high frequency stop.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output
2.	.1MFD	"	1615KC	"	"	A5	Check the physical position of the oscillator slug. The slotted end of the core should be 1-21/32 inches from the mounting end of the coil. Adjust A5 for maximum output.
3.	68MMF	High side to antenna connector. Low side to chassis.	1615KC	"	"	A6, A7 A8	Adjust for maximum output.
4.	68MMF	"	1400KC	Tune for max. output	"	A9, A10, A11	Adjust for maximum output. Repeat step 4.
5.	68MMF	"	1000KC	"	"	A12	A12 is the pointer adjustment. Adjust so pointer is on the first 0 of 100 on the dial.

After set is installed in car, fully extend the antenna and tune in a weak station near 1400KC. Adjust A8 for maximum volume.

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"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1950 by Howard W. Sams & Co., Inc., Indianapolis Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

OLDSMOBILE
MODEL 982421

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: OLDSMOBILE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1A	RF Amp.	5229	6SK7	8N	Used in receivers with serial No. above 1-38500.
B	RF Amp.	5290	7A7	8V	Used in receivers with serial No. below 1-38500.
V2A	Converter	5222	6SA7	8R	Used in receivers with serial No. above 1-38500.
B	Converter	5301	7Q7	8AL	Used in receivers with serial No. below 1-38500.
V3A	IF Amp.	5229	6SK7	8N	Used in receivers with serial No. above 1-38500.
B	IF Amp.	5290	7A7	8V	Used in receivers with serial No. below 1-38500.
V4A	DET.-AVC-AF	5233	6SR7	8Q	Used in receivers with serial No. above 1-38500.
B	DET.-AVC-AF	5298	7E6	8W	Used in receivers with serial No. below 1-38500.
V5A	Power Output	5241	6V6GT	7AC	Used in receivers with serial No. above 1-38500.
B	Power Output	5295	7C5	6AA	Used in receivers with serial No. below 1-38500.
V6A	Power Output	5241	6V6GT	7AC	Used in receivers with serial No. above 1-38500.
B	Power Output	5295	7C5	6AA	Used in receivers with serial No. below 1-38500.
V7A	Rectifier	5003	0Z4	4R	Used in receivers with serial No. above 1-38500.
B	Rectifier	5003	0Z4	4R	Used in receivers with serial No. below 1-38500.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: OLDSMOBILE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	20	400	7241198	AF44J4A	UP2245C		EL-322	■ Filter
B	20	400						▲ Filter
C	20	25						Output Cathode Bypass
C2	.004	600	E402	P688-004	PTE6D4	811-005	TM-24	Isolation
C3	.01	600	E103	P688-01	PTE6S1	821-01	TM-11	AVC Filter
C4	.05	200	E503	P288-05	PTE4S5		TM-15	AVC Filter
C5	68	500	G680	1468-000075	5W5Q7	GP1K-68	1FM-475	RF Coupling
C6	300		7258445			N080-335-300		Fixed Trimmer
C7	1200	500	G122	1467-0015	1W5D15	GP2L-0012	1FM-215	Osc. Anode Decoupling
C8	.05	400	E503	P488-05	PTE4S5		TM-15	RF Bypass
C9	10	300	G100	1468-00001	5W5Q1	GP1K-10	MS-41	IF Coupling
C10	.002	600	G222	P688-002	PTE6D2	GP2M-002	TM-22	Tone Compensation
C11	.005	600	E502	P688-005	PTE6D5	811-005	TM-25	Tone Compensation
C12	.01	400	E103	P488-01	PTE4S1	821-01	TM-11	Audio Coupling
C13	.01	400	E103	P488-01	PTE4S1	821-01	TM-11	AF Amp. Cathode Bypass
C14	.1	400	E104	P488-1	PTE4P1		TM-1	Audio Coupling
C15	.0015	800	7236134	P1088-0015	PTE16D1		MB-21	Output Plate Bypass
C16	.006	1600	H602	P1688-006	PTE16D6		MB-26	Buffer

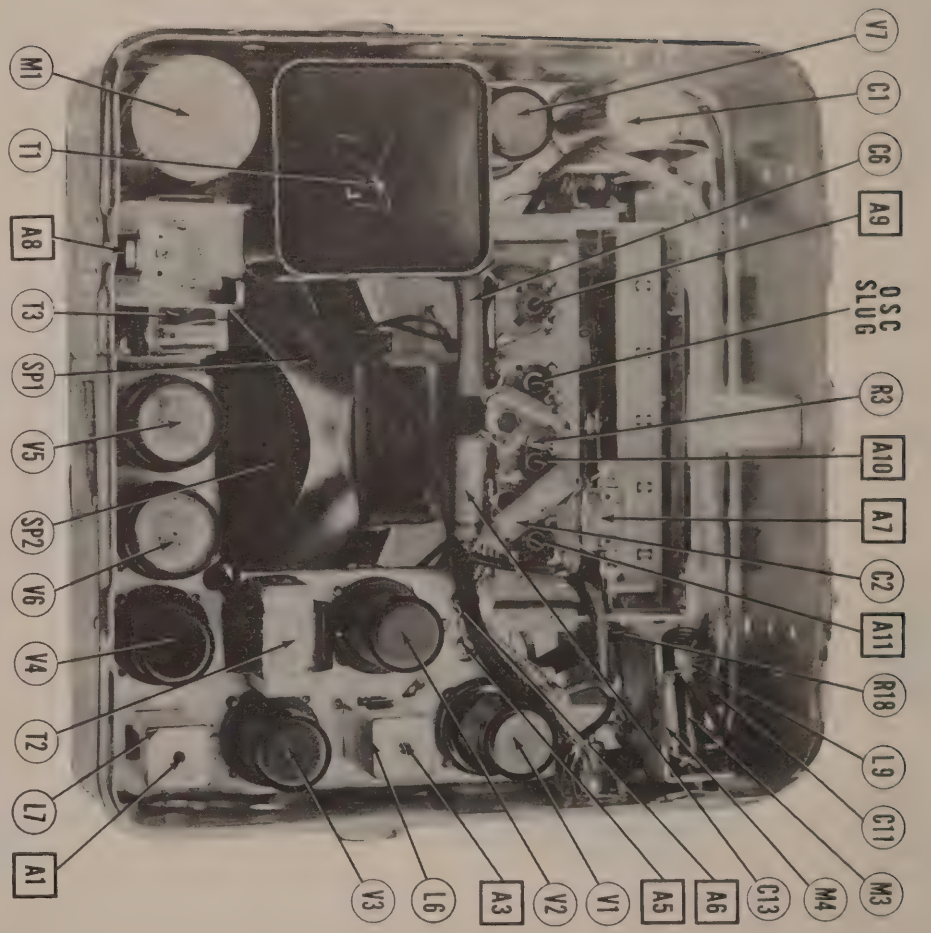
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLDSMOBILE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ to Inf.	½	7256697			Tone control
B	300KΩ	½				Volume control and switch, tapped at 50KΩ

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLDSMOBILE PART No.	IRC PART No.	IDENTIFICATION CODES
R2	68Ω	½	A680	BW-½-68	RF Cathode
R3	1 Meg.	½	A105	BTS-1 Meg.	AVC Network
R4	15KΩ	1	B153	BTA-15K	RF Plate
R5	330KΩ	½	A334	BTS-330K	AVC Network
R6	10 Meg.	½	A106	BTS-10 Meg.	AVC Network
R7	22KΩ	½	A223	BTS-22K	Osc. Grid

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: OLDSMOBILE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1A	RF Amp.	5239	6BK7	8N	Used in receivers with serial No. above 1-38500.
B	RF Amp.	5290	7A7	8V	Used in receivers with serial No. below 1-38500.
V2A	Converter	5222	6SA7	8R	Used in receivers with serial No. above 1-38500.
B	Converter	5301	7Q7	8AL	Used in receivers with serial No. below 1-38500.
V3A	IF Amp.	5239	6BK7	8N	Used in receivers with serial No. above 1-38500.
B	IF Amp.	5290	7A7	8V	Used in receivers with serial No. below 1-38500.
V4A	DET.-AVC-AF	5233	6BR7	8Q	Used in receivers with serial No. above 1-38500.
B	DET.-AVC-AF	5298	7E8	8W	Used in receivers with serial No. below 1-38500.
V5A	Power Output	5241	6V6GT	7AC	Used in receivers with serial No. above 1-38500.
B	Power Output	5295	7C5	6AA	Used in receivers with serial No. below 1-38500.
V6A	Power Output	5241	6V6GT	7AC	Used in receivers with serial No. above 1-38500.
B	Power Output	5295	7C5	6AA	Used in receivers with serial No. below 1-38500.
V7A	Rectifier	5003	0Z4	4R	Used in receivers with serial No. above 1-38500.
B	Rectifier	5003	0Z4	4R	Used in receivers with serial No. below 1-38500.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: OLDSMOBILE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	20	400	7241198	AF4424A	UP2245C		EL-322	■ Filter
B	20	400						▲ Filter
C	20	25						Output Cathode Bypass
C2	.004	600	E403	P688-004	PTE6D4	811-005	TM-24	Isolation
C3	.01	600	E103	P688-01	PTE6B1	821-01	TM-11	AVC Filter
C4	.05	300	E503	P288-05	PTE485		TM-15	AVC Filter
C5	68	500	G880	1468-000075	5W5Q7	GP1K-68	1FM-475	RF Coupling
C6	300		7256445			N080-335-3U0		Fixed Trimmer
C7	1200	500	G122	1467-0015	1W5D15	GP2L-0012	1FM-215	Osc. Anode Decoupling
C8	.05	400	E503	P488-05	PTE485		TM-15	RF Bypass
C9	10	300	G100	1468-00001	5W5Q1	GP1K-10	MS-41	IF Coupling
C10	.003	600	G322	P688-003	PTE6D3	GP2M-003	TM-22	Tone Compensation
C11	.005	600	E502	P688-005	PTE6D5	811-005	TM-25	Tone Compensation
C12	.01	400	E103	P488-01	PTE4B1	821-01	TM-11	Audio Coupling
C13	.01	400	E103	P488-01	PTE4B1	821-01	TM-11	AF Amp. Cathode Bypass
C14	.1	400	E104	P488-1	PTE4P1		TM-1	Audio Coupling
C15	.0015	600	7236134	P1088-0015	PTE16D1		MB-21	Output Plate Bypass
C16	.006	1600	H602	P1688-006	PTE18D6		MB-26	Buffer

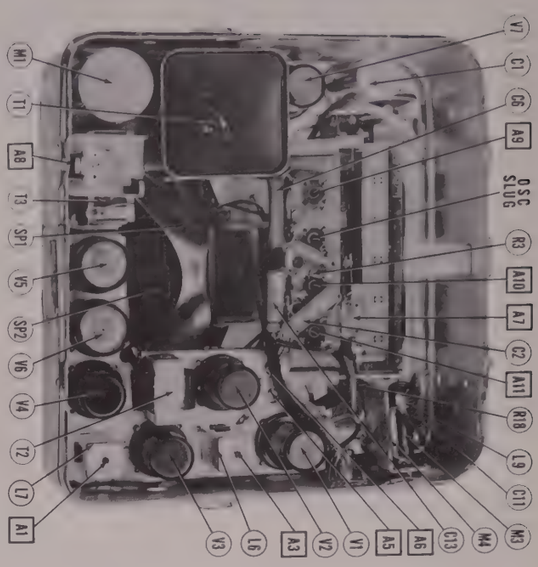
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLDSMOBILE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ to Inf.	½	7256697			Tone control
B	300KΩ	½				Volume control and switch, tapped at 50KΩ

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLDSMOBILE PART No.	IRC PART No.	IDENTIFICATION CODES
R2	68Ω	½	A680	BW-½-68	RF Cathode
R3	1 Meg.	½	A105	BTS-1 Meg.	AVC Network
R4	15KΩ	1	B153	BTA-15K	RF Plate
R5	330KΩ	½	A334	BTS-330K	AVC Network
R6	10 Meg.	½	A106	BTS-10 Meg.	AVC Network
R7	22KΩ	½	A223	BTS-22K	Osc. Grid

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: OLDSMOBILE PART No.	IRC PART No.	IDENTIFICATION CODES
R8	22KΩ	1	B226	BTA-22K	Osc. Anode Decoupling
R9	33KΩ	1	B333	BTA-33K	Screen Dropping
R10	100Ω	½	A101	BW-½-100	IF Cathode See Note 1
R11	1 Meg.	½	A105	BTS-1 Meg.	AVC Network
R12	1 Meg.	½	A105	BTS-1 Meg.	Diode Load
R13	47KΩ	½	A473	BTS-47K	Diode Filter
R14	1000Ω	½	A102	BTS-1000	AF Cathode
R15	1000Ω	½	A102	BTS-1000	AF Cathode
R16	820KΩ	½	A824	BTS-820K	Tone Compensation
R17	1 Meg.	½	A105	BTS-1 Meg.	AF Grid
R18	39KΩ	½	A393	BTS-39K	Tone Compensation
R19	27KΩ	1	B273	BTA-27K	AF Plate
R20	330Ω	1	B331	BW-1-330	Output Cathode- Wire Wound
R21	1800Ω	2	*	BW-2-1800	Filter-Wire Wound
R22	220Ω	1	B221	BW-1-220	Hash Suppression

* Replace with a 2700Ω, 2 watt resistor, part No.C272 in parallel with a 5600Ω, 1 watt resistor part No. B562.
Note 1. Models below serial number 1-38500 use a 68Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: OLDSMOBILE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	6VDC at 4.9A	610VCT .082ADC			7255881	P-4065	P-4076 ①	

① Drill new mounting holes.

TRANSFORMER (DRIVER)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: OLDSMOBILE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T2	MATCHED TO P-P GRIDS		2000Ω CT		7256432				

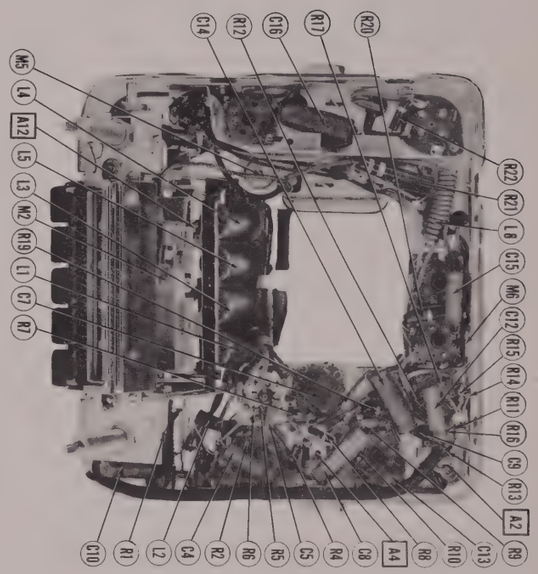
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: OLDSMOBILE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T3	7.5KΩ CT	3.7Ω	375Ω CT	.2Ω	7258182	A-3823 ②	A-2904 ②	RO-304 ②	② Bend mounting tabs down and drill or file chassis to fit.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: OLDSMOBILE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
SP1	FIELD	V. C. IMP.	7258146	ST-810 MOD.P69-V	69A2	
	PM	3.7Ω				
SP2	CONE DIA.	V. C. DIA.				
	6 1/8" x 9"	1"				

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: OLDSMOBILE PART No.	REPLACEMENT DATA: MEISSNER PART No.	
L1A	Ant. Coil	10Ω		7258367		Die cast coil cover.
B	Ant. Coil			7258375		Sheet metal coil cover.
L2	Ant. Spark Coil	4.8Ω		7240251		
L3A	1st RF Coil	10Ω		7258367		Die cast coil cover.
B	1st RF Coil			7258375		Sheet metal coil cover.
L4A	2nd RF Coil	10Ω		7258367		Die cast coil cover.
B	2nd RF Coil			7258375		Sheet metal coil cover.
L5A	Osc. Coil	3.8Ω		7258568		Die cast coil cover.
B	Osc. Coil			7258376		Sheet metal coil cover.
L6A	1st IF	50Ω	50Ω	7257832		
B	1st IF			1219508		Used in sets with serial No. above 1-38500.
L7A	2nd IF	50Ω	50Ω	7256932		
B	2nd IF			1219509		Used in sets with serial No. above 1-38500.
L8	Hash Choke	0Ω		1217846		
L9	Spark Choke	0Ω		7258434		Includes fuse connector and spark plate condenser.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA: OLDSMOBILE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	RADIART PART No.	INSTALLATION NOTES
M1	Int.	6V	115 ~	8542	A-100	C-00	5301	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: OLDSMOBILE PART No.		NOTES
M2	Bayonet	6-8	.25	Blue	44		Type #44

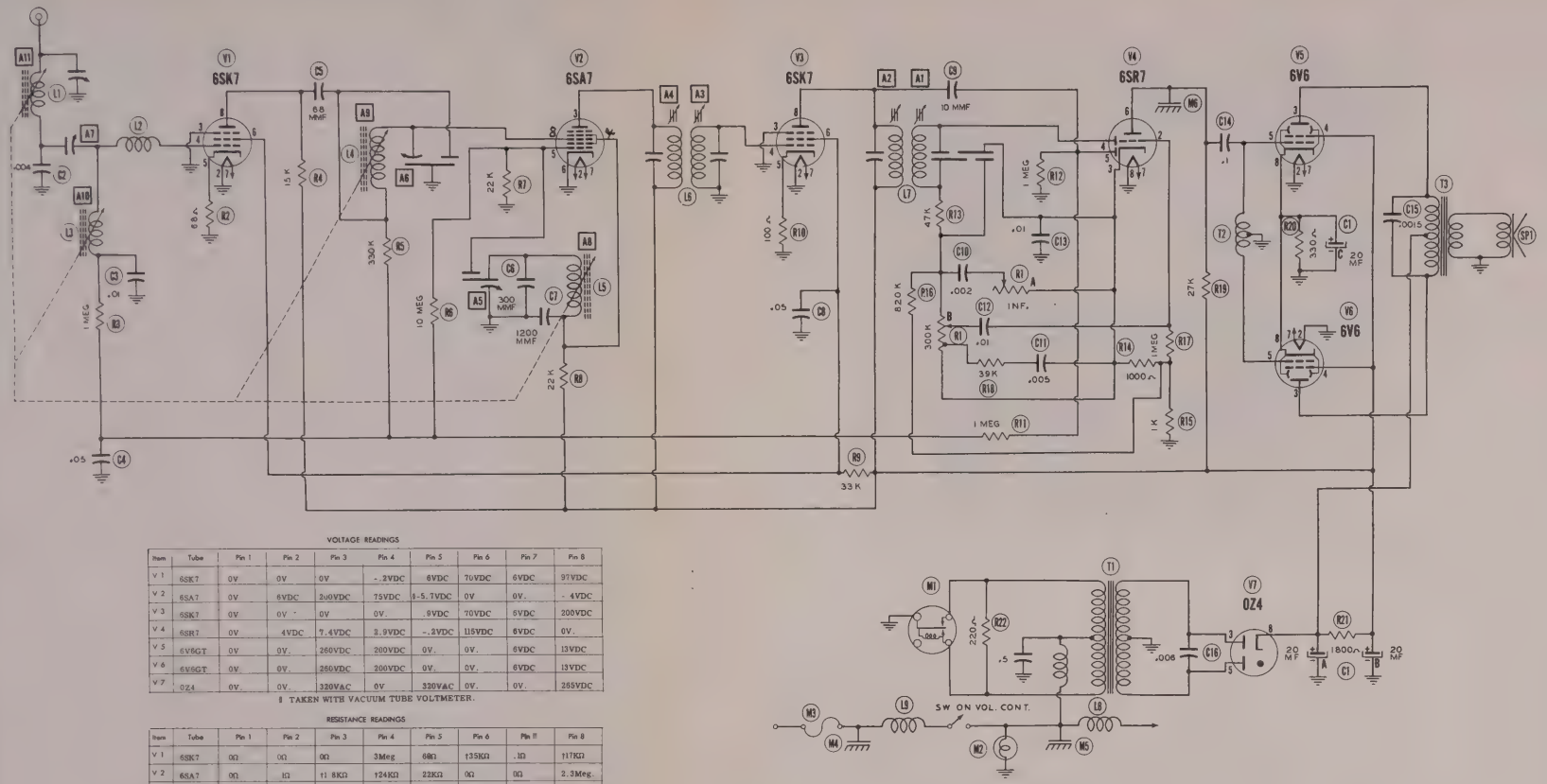
PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	OLDSMOBILE PART No.	NOTES
M3	Fuse	120151	15A
M4	Spark Plate	1212278	
M4	Spark Plate	1217848	
M6	AF Plate Bypass	1217848	
A5	Dual Trimmer	7258372	Osc. Adj.
A6			Mixer Adj.
A7	Trimmer	7258213	RF Amp. Adj.
A8	Trimmer	7258160	Ant. Adj.

PUSHBUTTON ADJUSTMENTS

1. Pull pushbutton to the left and outward.
2. Carefully tune to the de sired station manually.
3. Depress button as far as it will go.
4. Repeat steps 1, 2 and 3 for each pushbutton.
5. The setting of each button may be checked by tuning in the station manually and depressing the button . If there is any change repeat steps 1, 2 and 3.



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SK7	0V	0V	0V	-.2VDC	6VDC	70VDC	6VDC	97VDC
V 2	6SA7	0V	6VDC	2u0VDC	75VDC	4-5.7VDC	0V	0V.	- 4VDC
V 3	6SK7	0V	0V	0V	0V.	.9VDC	70VDC	6VDC	200VDC
V 4	6SR7	0V	4VDC	7.4VDC	3.9VDC	-.2VDC	115VDC	6VDC	0V.
V 5	6V6GT	0V	0V.	260VDC	200VDC	0V.	0V.	6VDC	13VDC
V 6	6V6GT	0V.	0V.	260VDC	200VDC	0V.	0V.	6VDC	13VDC
V 7	0Z4	0V.	0V.	320VAC	0V	320VAC	0V.	0V.	265VDC

‖ TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7‖	Pin 8
V 1	6SK7	0Ω	0Ω	0Ω	3Meg	68Ω	†35KΩ	.1Ω	†17KΩ
V 2	6SA7	0Ω	1Ω	†1.8KΩ	†24KΩ	22KΩ	0Ω	0Ω	2.3Meg.
V 3	6SK7	0Ω	0Ω	0Ω	[illegible]	100Ω	†35KΩ	.1Ω	†1.8KΩ
V 4	6SR7	0Ω	1Meg	2KΩ	250KΩ	1Meg.	†270KΩ	.1Ω	0Ω
V 5	6V6GT	Inf	0Ω	†170Ω	†1.8KΩ	1000Ω	Inf.	.1Ω	330Ω
V 6	6V6GT	Inf	0Ω	†190Ω	†1.8KΩ	850Ω	Inf.	.1Ω	330Ω
V 7	0Z4	0Ω	Inf	310Ω	Inf.	290Ω	Inf	Inf.	170KΩ

† MEASURED FROM PIN 8 OF V7.

IF = 260 KC

1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.

2 - Socket connections are shown as bottom views.

3 - Measured values are from socket pin to common negative.

4 - Battery voltage maintained at six volts for voltage readings.

5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.

6 - Volume control at maximum, no signal applied for voltage measurements.

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PHILCO
MODEL 49-101 (BATTERY-LINE OPERATED)

PHILCO
MODEL 49-101 (BATTERY-LINE OPERATED)

TRADE NAME	Philco Model 49-101
MANUFACTURER	Philco Corp., Tioga and "C" St., Philadelphia, Pa.
TYPE SET	Three Power Portable Superheterodyne Receiver
TUBES (FOUR)	Types 1R5 Converter, 1T4 IF Amp., 1U5 DET-AVC-AF Amp., 3V4 Power Output
POWER SUPPLY	105-120 Volts AC or DC and 90 Volts "B" Supply and 7.5 Volt "A" Supply in Pack Form
RATING	.15 Amp. at 117 Volts AC or 11MA at 90 Volts DC and 55MA at 7.5 Volts DC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning gang fully closed and set dial pointer to the calibration dot on the left hand end of the dial backplate.

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to ext. antenna lead. Low side to B-.	455KC (400 ~ Mod.)	Tuning gang fully closed	Across voice coil	A1, A2, A3	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	50MMF	"	1600KC	Set pointer to calibration dot on right end of dial backplate.	"	A4	Adjust for maximum output.
3.	50MMF	"	1500KC	Tune for max. output.	"	A5	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

PHILCO MODEL 49-101

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1T4	1T4	6AR	
V3	DET.-AVC-AF	1U5	1U5	6BW	
V4	Power Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	60	150	30-2568-26	AF1262D12A	UP53315C		D13329	▬ Filter
B	30	150			10			■ Filter
C	10	150						▲ Filter
D	60	25						Filament Bypass
C2	10		30-1224-26	1468-00001	5W5Q1	GP1K-10	MS-41	RF Coupling
C3	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Coupling
C4	1.5		30-1221-3			NPOK-1.5		Neutralizing *
C5	51			1468-00005	5W5Q5	GP1K-50	1FM-45	Osc. Grid Cap.
C6	10			1469-00001	5R5Q1	NPOK-10	MS-41	Fixed Trimmer *
C7	.003	600	61-0179	P688-003	PTE6D3	GP2M-003	TM-23	Tuning Cap. Isolation
C8	.05	200	61-0122	P288-05	PTE4S5		TM-15	AVC Filter
C9	.1	400	61-0113	P488-1	PTE4P1		TM-1	Filament Bypass
C10	.1	200	61-0113	P288-1	PTE4P1		TM-1	Decoupling
C11	1.5		30-1221-3			NPOK-1.5		Neutralizing
C12	.002	200	61-0108	P285-002	ZYW4D2	GP2M-002	68P27	Audio Coupling
C13	.05	200	61-0122	P288-05	PTE4S5		TM-15	AF Screen Bypass
C14	.25	100	61-0125	P488-25	GT2P25		68P19	Filament Bypass
C15	.004	600	61-0179	P688-004	PTE6D4	811-005	TM-24	Audio Coupling
C16	220	500	30-1224-20	1468-00025	5W5T25	GP2K-220	1FM-325	Output Grid Bypass
C17	.004	600	61-0179	P688-004	PTE6D4		TM-24	Output Plate Bypass
C18	.05	400	61-0122	P488-05	PTE4S5		TM-15	Line Filter

* Not used in all models.

CONTROLS

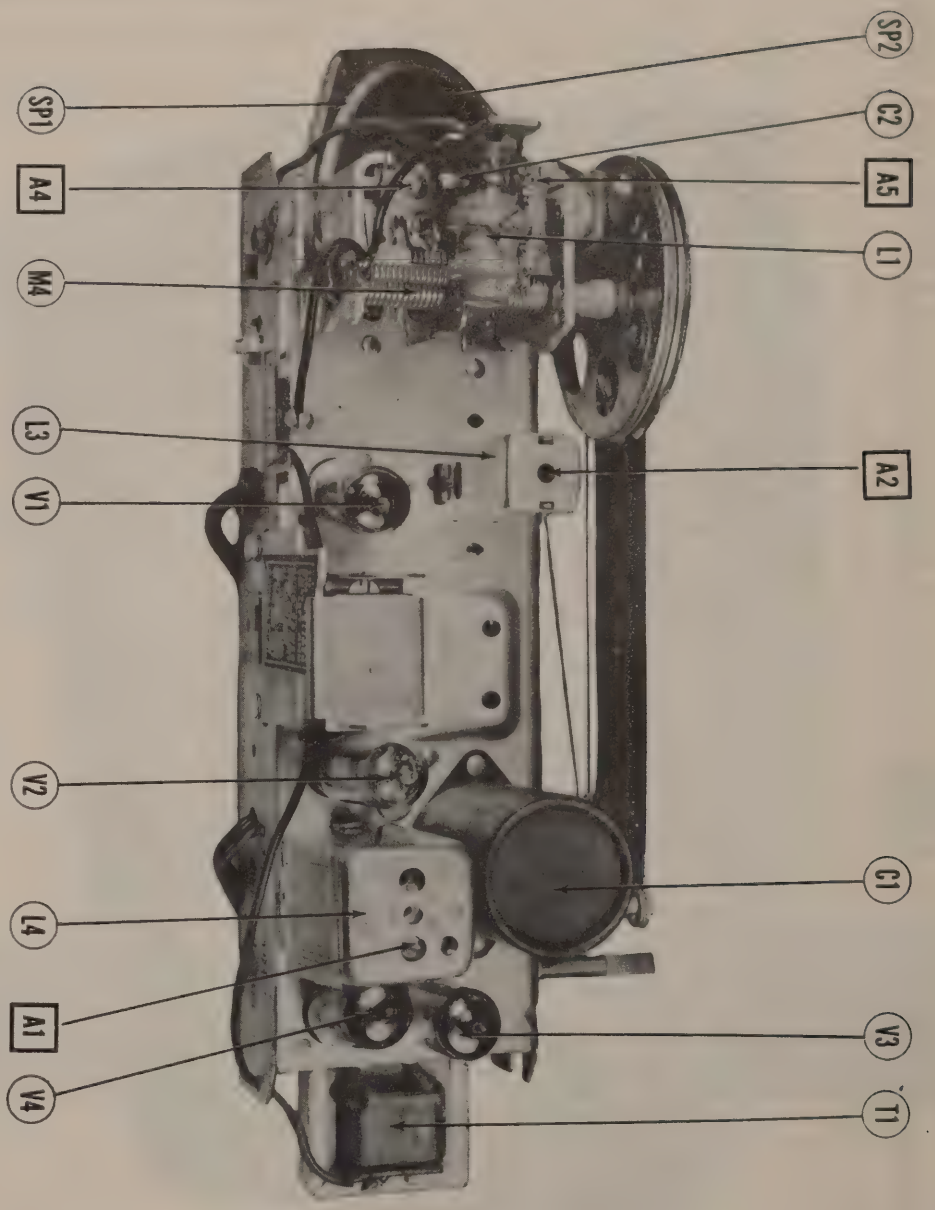
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	33-5538-28	Q13-137		Volume control
B	Switch		Not Req.	76-2		Attach to R1A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	IDENTIFICATION CODES
R2	1 Meg.	½	66-5103340	BTS-1 Meg.	Conv. Grid
R3	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	AVC Network
R4	100KΩ	½	66-4103340	BTS-100K	Osc. Grid
R5	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	AVC Network
R6	10KΩ	½	66-3103340	BTS-10K	Screen Dropping
R7	470Ω	½	66-1473340	BTS-470	Filament String
R8	270Ω	½	66-1273340	BW-½-270	Filament String-See Note
R9	4.7 Meg.	½	66-5473340	BTS-4.7 Meg.	AF Grid
R10	10 Meg.	½	66-6103340	BTS-10 Meg.	AF Screen
R11	1.2 Meg.	½	66-5123340	BTS-1.2 Meg.	AF Plate
R12	470KΩ	½	66-4473340	BTS-470K	Output Grid
R13	680Ω	½	66-1683340	BTS-680	Filament String
R14	150KΩ	½	66-4153340	BTS-150K	Isolation
R15	2200Ω	½	66-2223340	BTS-2200	Filter
R16A	1125Ω	5	33-3431-5	ABA-2250 *	Filter-Wire Wound
B	1125Ω	5			Filament Dropping-Wire Wound
R17	60Ω	1	33-1334		Surge Limiter

* Set slider at 1125Ω from one end.
Note. Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	9.1KΩ	3.6Ω	550Ω	.3Ω	32-8259-3	A-3879	A-2932	RO-16	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			PHILCO PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.		ST-803		
SP1	PM	3.6Ω	36-1629-1	MOD. P525-V	52A1	
	CONE DIA.	V. C. DIA.				
SP2	5"	3/4"				

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA	
		PRI.	SEC.	PHILCO PART No.	MEISSNER PART No.
L1	Ant. Coil	15Ω	2.5Ω	32-3919-4	14-1071
L2	Osc. Coil	3Ω	7Ω	32-4282-1	14-1074
L3	Input IF	24Ω	24Ω	32-4160-4	16-6668
L4	Output IF	40Ω		32-3987-3	

SELENIUM RECTIFIER

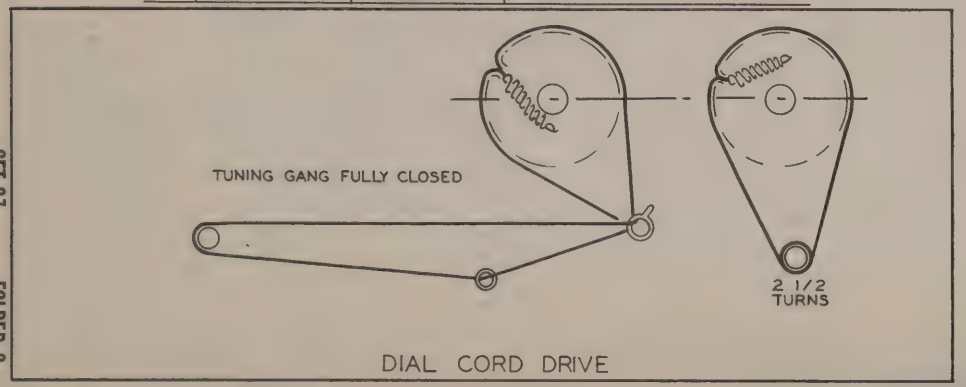
ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	PHILCO PART No.	SYLVANIA PART No.		
M1	.065A	34-8003	NB-5		

BATTERIES

ITEM No.	VOLTAGE	PHILCO PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	7.5V "A" 90V "B"	P-326			753			F6A60	

MISCELLANEOUS

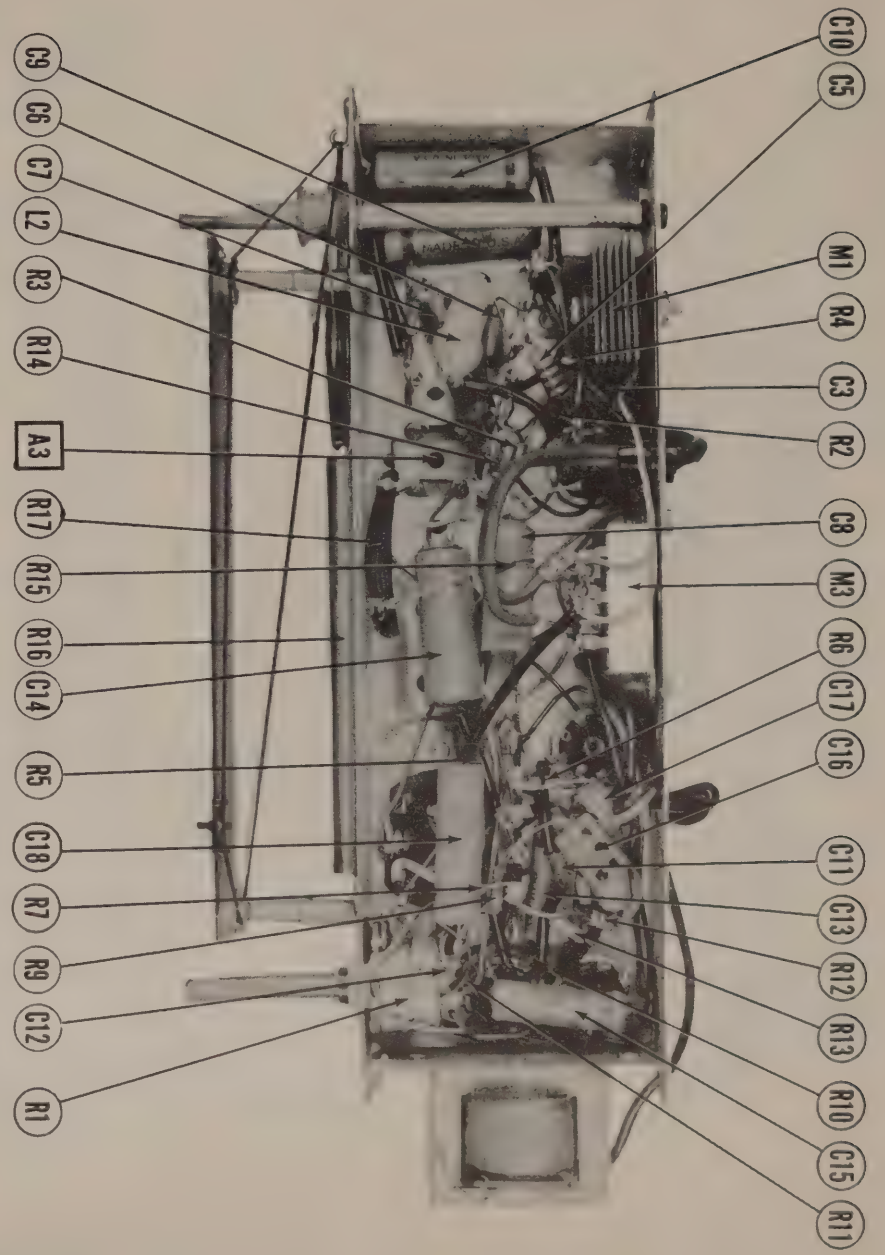
ITEM No.	PART NAME	PHILCO PART No.	NOTES
M3	Switch	42-1821	Power Change-Over
M4	2 Gang Var. Cap.	32-2727-2	(27-496MMF, 24-165MMF)W/T
	Cabinet	10732	
	Dial Pointer	56-6513FCP	
	Dial Scale	54-5041	
	Knob	54-4227-5	



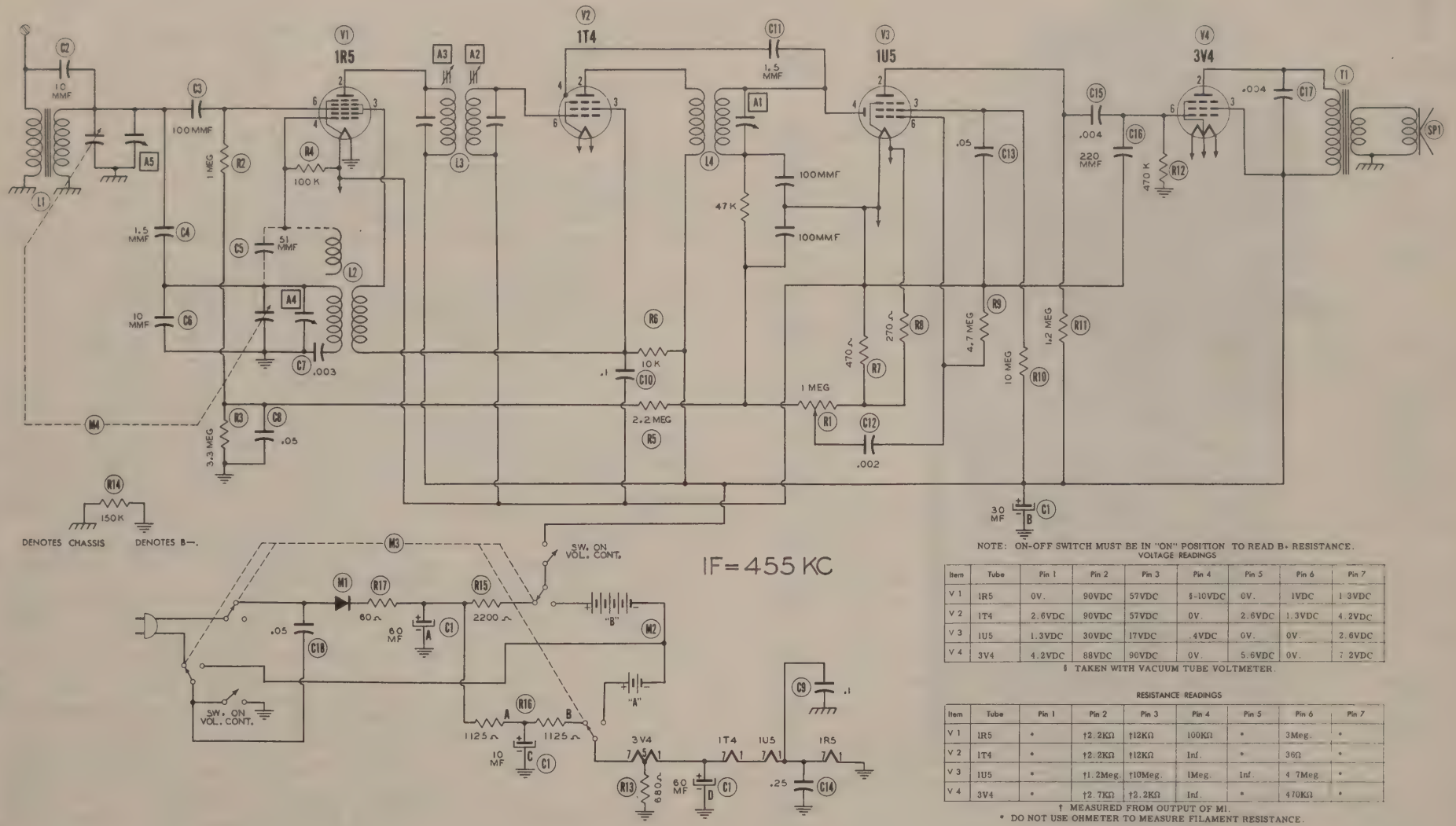
DIAL CORD DRIVE

SET 87 FOLDER 8

CHASSIS—BOTTOM VIEW



PHILCO MODEL 49-101



NOTE: ON-OFF SWITCH MUST BE IN "ON" POSITION TO READ B+ RESISTANCE.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	0V.	90VDC	57VDC	§-10VDC	0V.	1VDC	1.3VDC
V 2	1T4	2.6VDC	90VDC	57VDC	0V.	2.6VDC	1.3VDC	4.2VDC
V 3	1U5	1.3VDC	30VDC	17VDC	.4VDC	0V.	0V.	2.6VDC
V 4	3V4	4.2VDC	88VDC	90VDC	0V.	5.6VDC	0V.	7.2VDC

§ TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†2.2KΩ	†12KΩ	100KΩ	*	3Meg.	*
V 2	1T4	*	†2.2KΩ	†12KΩ	Inf.	*	36Ω	*
V 3	1U5	*	†1.2Meg.	†10Meg.	1Meg.	Inf.	4.7Meg.	*
V 4	3V4	*	†2.7KΩ	†2.2KΩ	Inf.	*	470KΩ	*

† MEASURED FROM OUTPUT OF M1.
* DO NOT USE OHMETER TO MEASURE FILAMENT RESISTANCE.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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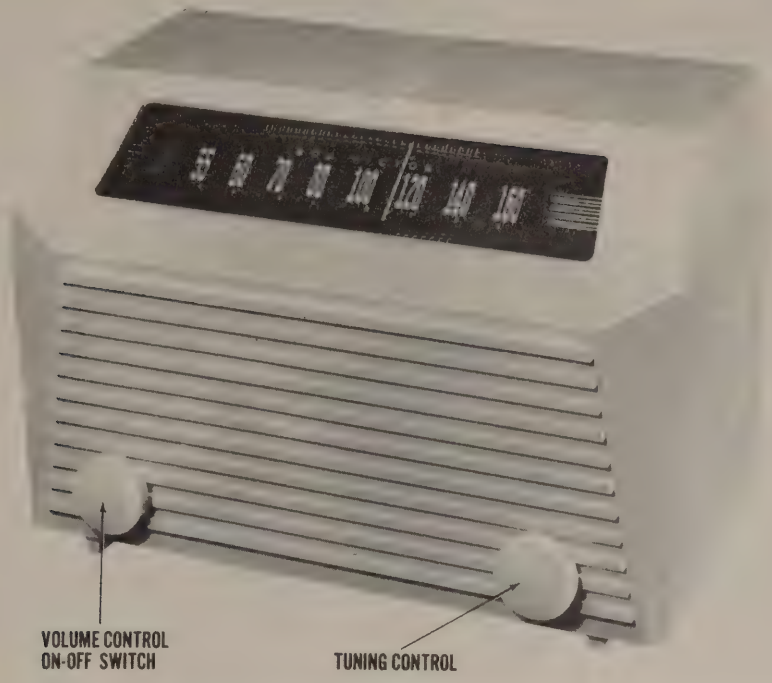
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RCA VICTOR MODELS 9X641
(Ch. RC-1080) 9X642 (Ch. RC-1080A)



RCA VICTOR MODELS 9X641
(Ch. RC-1080) 9X642 (Ch. RC-1080A)

RCA VICTOR MODEL 9X642

TRADE NAME	RCA Victor Models 9X641 (Ch. RC-1080), 9X642 (Ch. RC-1080A)
MANUFACTURER	RCA Victor Division, Radio Corp. of America, Camden, New Jersey
TYPE SET	AC-DC Operated Superheterodyne Receiver with Loop Antenna
TUBES(SIX)	Types 12SK7 RF Amp., 12SA7 Converter, 12SK7 IF Amp., 12SQ7 DET-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	110-120 Volts AC or DC — RATING .26 Amp. at 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer turn tuning gang fully closed and set the pointer 2 inches to the right of the left hand end of the dial backplate.

Use isolation transformer if available. If not connect a .1MFD capacitor in series with low side of signal generator and B-.

Loop should ebe maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 8 (Grid) of 12SA7 (V2). Low side to B-.	455KC (400 ~ Mod.)	Quiet point near 600KC	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	100MMF	High side to ext. antenna terminal. Low side to B-.	1400KC	Set pointer 5 7/16 ins. to right of left hand end of dial backplate.	"	A5, A6, A7	"
3.	100MMF	"	600KC	Set pointer 2 15/16 ins. to right of left end of dial backplate.	"	A8	Connect a 22KΩ resistor across terminals 3 and 5 of L2. Rock tuning gang while adjusting A8 for maximum output. Remove the 22KΩ resistor.
4.	100MMF	"	"	"	"	A9	Adjust for maximum output. Repeat steps 2, 3, and 4 until no further improvement can be made.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

RCA VICTOR
MODEL 9X642

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	12SK7	12SK7	8N	
V2	Converter	12SA7	12SA7	8R	
V3	IF Amp.	12SK7	12SK7	8N	
V4	DET.-AVC-AF	12SQ7	12SQ7	8Q	
V5	Power Output	35L6GT	35L6GT	7AC	
V6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	80	150	74662	AF101010D4A *	UP55515C*		EL-452*	▲ Filter
B	50	150						■ Filter
C2	47		39042	1469-00005	5R5Q5	N750L-47	MS-45	Fixed Trimmer
C3	56		71924	1468-00005	5W5Q5	GP1K-56	1FM-45	Osc. Grid Cap.
C4	.1	400	70617	P488-1	PTE4P1		TM-1	AVC Filter
C5	.1	400	70617	P488-1	PTE4P1		72P52	Line Isolation
C6	150		73501	1468-00015	5W5T15	GP1K-150	1FM-315	Diode RF Filter
C7	.05	400	73553	P488-05	PTE4S5		TM-15	Phono Isolation
C8	.02	200	71928	P488-02	PTE4S2		TM-12	Audio Coupling
C9	150		73501	1468-00015	5W5T15	GP1K-150	1FM-315	AF Amp. Plate Bypass
C10	.002	200	72315	P688-002	PTE6D2	GP2M-002	TM-22	Audio Coupling
C11	.015	200	70572	P288-015	PTE6S15		TM-11	Output Plate Bypass
C12	.05	400	73553	P488-05	PTE4S5		TM-15	Line Filter

* Parllel sections to obtain desired capacity omit bypass section.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RCA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	½	38410	Q13-133	M-60-Z	Volume control
B	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions

RESISTORS

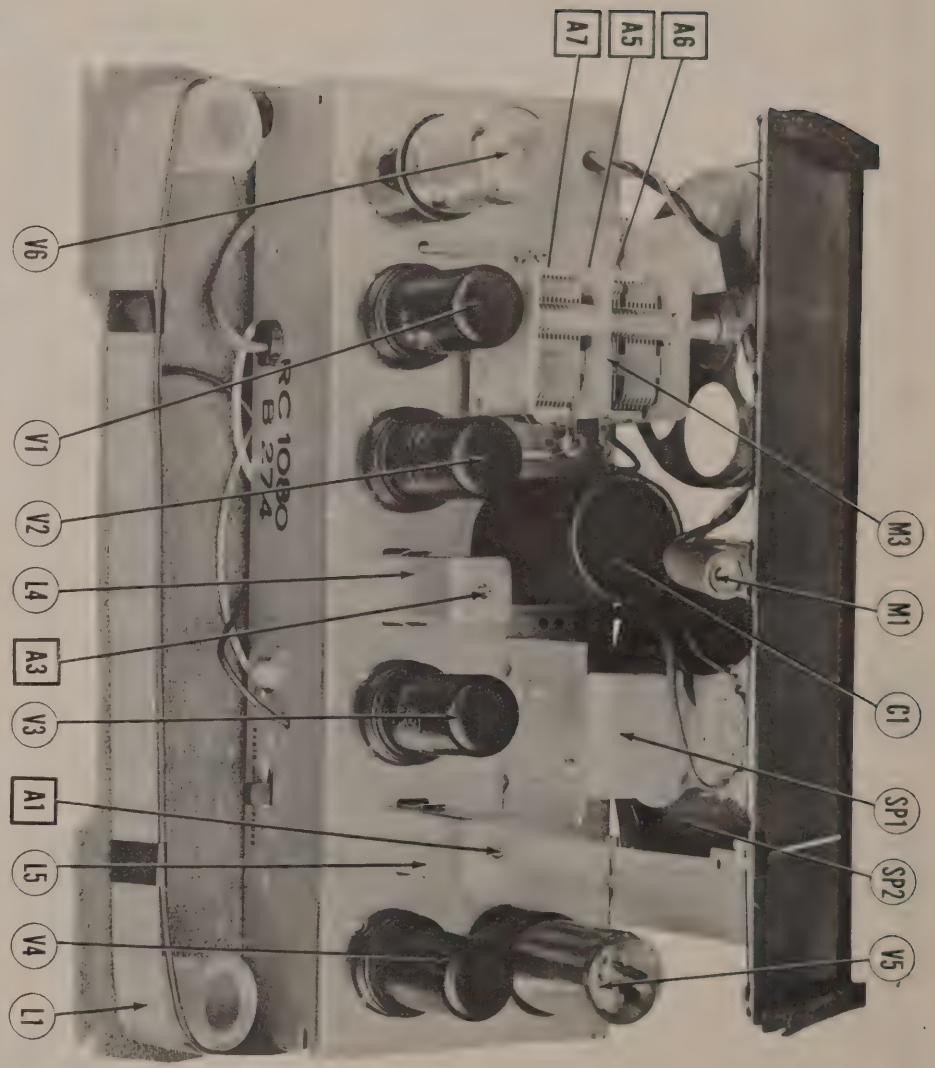
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RCA PART No.	IRC PART No.	IDENTIFICATION CODES
R2	330Ω	½		BW-½-330	RF Cathode See Note
R3	12KΩ	½		BTS-12K	RF Coil Shunt
R4	22KΩ	½		BTS-22K	Osc. Grid
R5	180Ω	½		BW-½-180	IF Cathode See Note
R6	220KΩ	½		BTS-220K	Isolation
R7	2.2 Meg.	½		BTS-2.2 Meg.	AVC Network
R8	56KΩ	½		BTS-56K	Diode Filter
R9	4.7 Meg.	½		BTS-4.7 Meg.	AF Grid
R10	220KΩ	½		BTS-220K	AF Plate
R11	470KΩ	½		BTS-470K	Output Grid
R12	120Ω	½		BW-½-120	Output Cathode
R13	1200Ω	1		BW-1-1200	Filter
R14	15Ω	½	74660		Surge Limiter-Wire Wound

Note. Some models use 68Ω resistor in this application.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T1	3.1KΩ	3.4Ω	260Ω Tap at 13.5Ω	.6Ω	73976	A-3330	A-3031	RO-3	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA RCA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-105 §		
SP1	PM	3.4Ω	73900	MOD. P5-X	5A07 §	§ Drill and tap magnet frame.
	CONE DIA.	V. C. DIA.				
SP2	4 3/8"	9/16"				

R F COILS

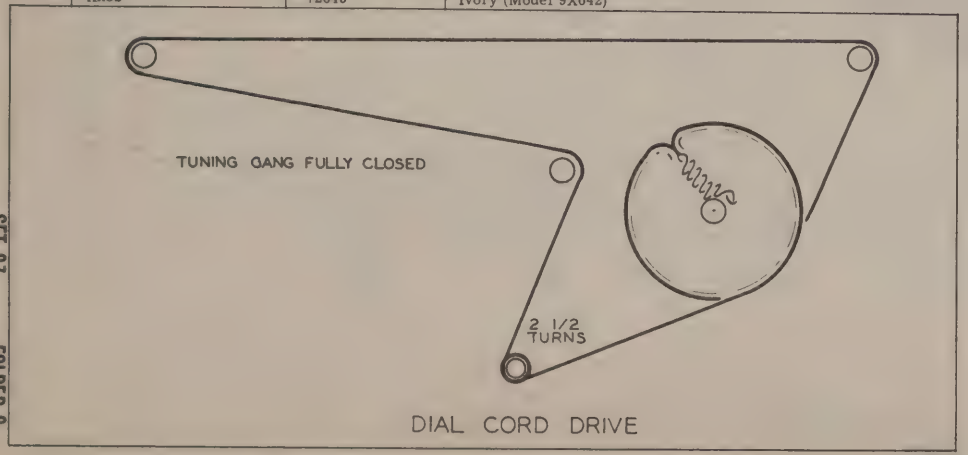
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA RCA PART No.	REPLACEMENT DATA MEISSNER PART No.	
L1A	Loop Ant.	15Ω		74695		Model 9X642
B	Loop Ant.			74694		Model 9X641
L2	RF Coil	32Ω	8Ω	73677		
L3	Osc. Coil	1Ω	9Ω	74693	14-1073	
L4	Input IF	11Ω	12Ω	73036	16-6678	
L5	Output IF	15Ω	15Ω	73037	16-6678 †	† Add capacitor from black lead to ground of same value as old.

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA RCA PART No.		NOTES
M1	Bayonet	6-8	.2	White	11765		Type #51

MISCELLANEOUS

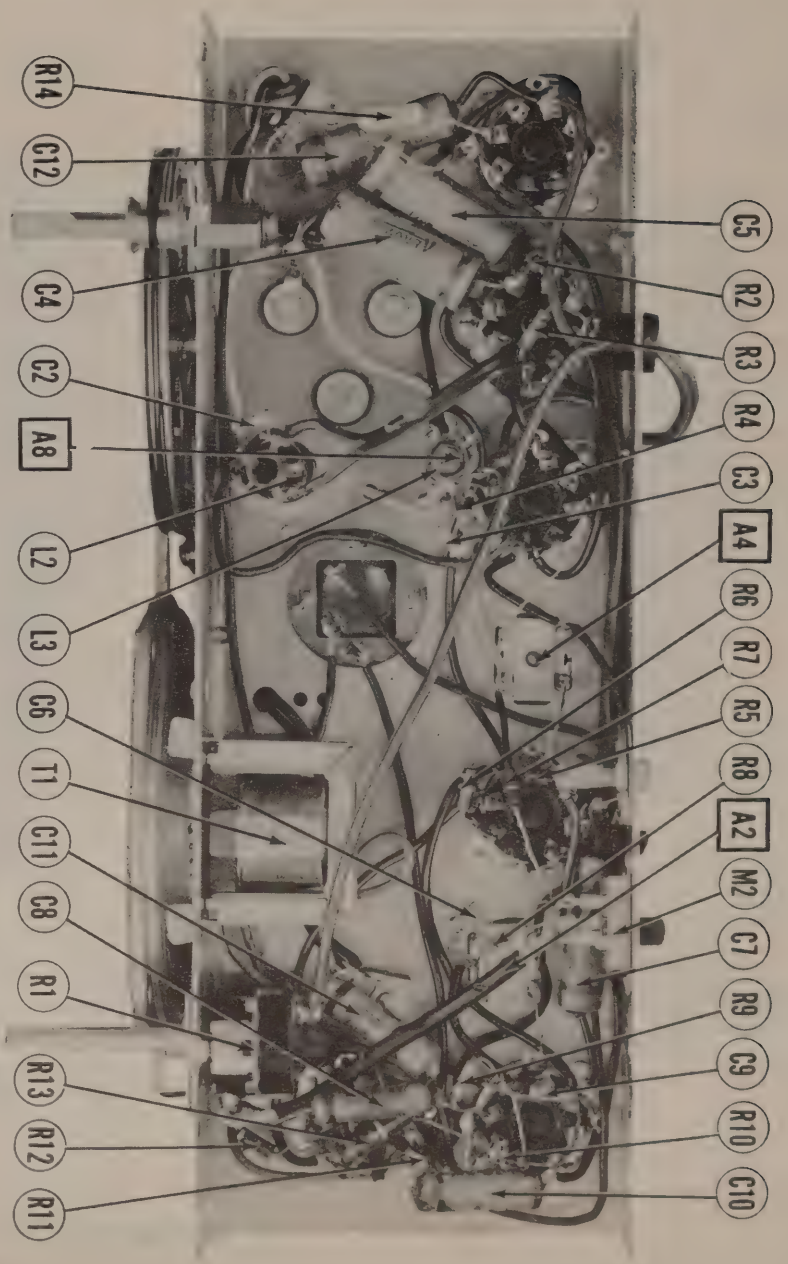
ITEM No.	PART NAME	RCA PART No.	NOTES
M2	Phono Switch	33634	
M3	2 Gang Var. Cap.	74692	(12-399MMF, 10-236MMF, 8-100MMF)
	Dial Pointer	74696	
	Dial Scale	74698	
	Cabinet	Y2135	Maroon (Model 9X641)
	Cabinet	Y2136	Ivory (Model 9X642)
	Knob	71821	Maroon (Model 9X641)
	Knob	72645	Ivory (Model 9X642)



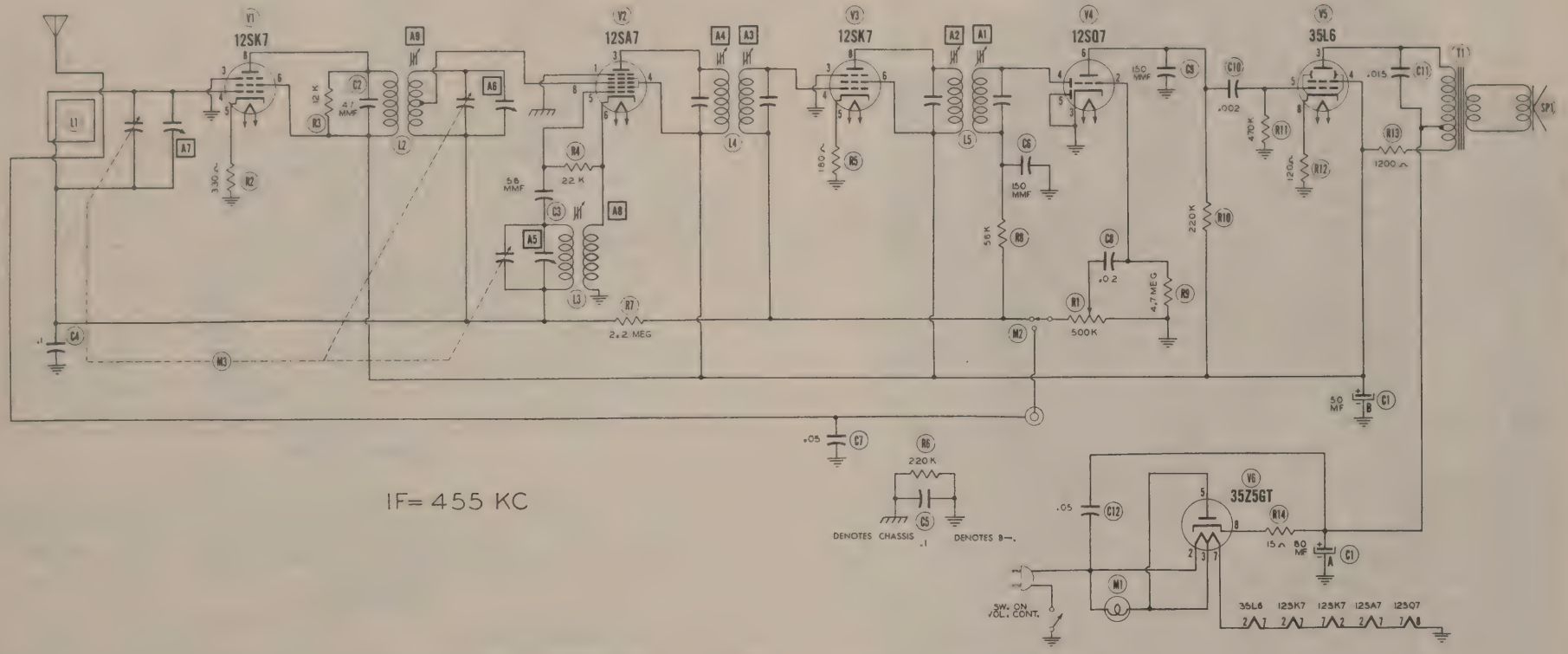
SET 87 FOLDER 9

RCA VICTOR MODEL 9X642

CHASSIS—BOTTOM VIEW



RCA VICTOR MODEL 9X642



IF= 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	0V	25VAC	0V	-.8VDC	2.2VDC	87VDC	38VAC	87VDC
V 2	12SA7	0V	25VAC	87VDC	87VDC	6-8.5VDC	0V.	12VAC	-.3VDC
V 3	12SK7	0V	50VAC	0V	-.8VDC	1.4VDC	87VDC	38VAC	87VDC
V 4	12SQ7	0V.	-.5VDC	0V	-.3VDC	0V.	55VDC	12VAC	0V
V 5	35L6GT	0V	85VAC	112VDC	87VDC	0V.	120VDC	50VAC	4.7VDC
V 6	35Z5GT	0V	117VAC	114VAC	0V.	114VAC	0V.	85VAC	122VDC

‡ TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	220KΩ	24Ω	0Ω	2.7 Meg	330Ω	†1.2KΩ	30Ω	†1.2KΩ
V 2	12SA7	220KΩ	24Ω	†1.2KΩ	†1.2KΩ	22KΩ	1Ω	12Ω	2.7 Meg.
V 3	12SK7	220KΩ	48Ω	0Ω	2.7 Meg.	180Ω	†1.2KΩ	30Ω	†1.2KΩ
V 4	12SQ7	220KΩ	4.7 Meg	0Ω	550KΩ	0Ω	†220KΩ	12Ω	0Ω
V 5	35L6GT	Inf.	80Ω	†240Ω	†1.2KΩ	470KΩ	†28Ω	45Ω	120Ω
V 6	35Z5GT	Inf.	50KΩ	110Ω	Inf.	110Ω	Inf	80Ω	50KΩ

† MEASURED FROM PIN 8 OF V6

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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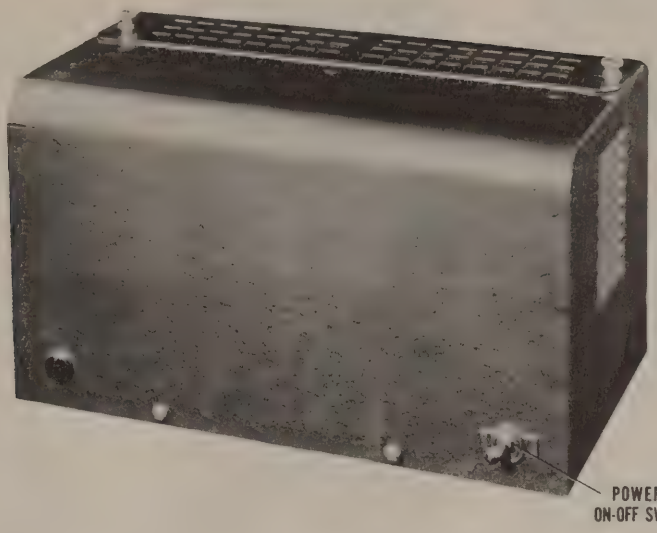
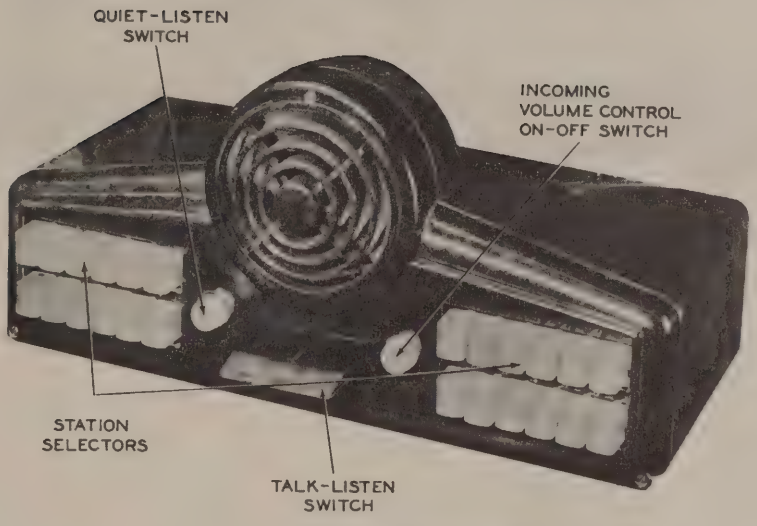
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RAULAND
MODELS BA21, 2306, 2312, 2318, 2324





RAULAND MODEL 2324

TRADE NAME	Rauland, Models BA21, 2306, 2312, 2318, 2324
MANUFACTURER	The Rauland Corp., 4245 N. Knox Ave., Chicago 41, Illinois
TYPE SET	AC Operated Intercommunication System
TUBES(FIVE)	Types 6SC7 1st AF Amp., 6SC7 2nd AF-Phase Inverter, (2) 6L6 Power Output, 5U4G Rectifier
POWER SUPPLY	110-120 Volts AC RATING .71 Amp. at 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RAULAND PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	1st AF Amp.	6SJ7	6SJ7	8N	
V2	2nd AF Amp. - Phase Inverter	6SC7	6SC7	8S	
V3	Power Output	6L6	6L6	7AC	
V4	Power Output	6L6	6L6	7AC	
V5	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RAULAND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	CE-706-A	AF4444J*	UP222245*		EL-420 †	• Filter
B	10	450						■ Filter
C	10	450						▲ Filter
D	10	450						Filter
C2	40	25	CE-406-C	PRS25/50	BR502A		TA-50	Output Cath. Bypass
C3	8	450	CE-805-E	PRS450/8	BR845A		UT-8	Decoupling
C4	.05	600		P688-05	GT6S5		TM-15	1st AF Screen Bypass
C5	.001	600		P688-001	GT6D5	GP2L-001	TM-21	Audio Coupling
C6	.001	600		P688-001	GT6D5	GP2L-001	TM-21	Audio Coupling
C7	.05	600		P688-05	GT6S5		TM-15	Audio Coupling
C8	.002	1600		P1688-002	GT16D2		MB-22	Output Plate Bypass
C9	220	500		1468-00025	5W5T25	GP2K-220	1FM-325	Fixed Trimmer

* Parallel sections to obtain desired capacity.
† Omit bypass section.

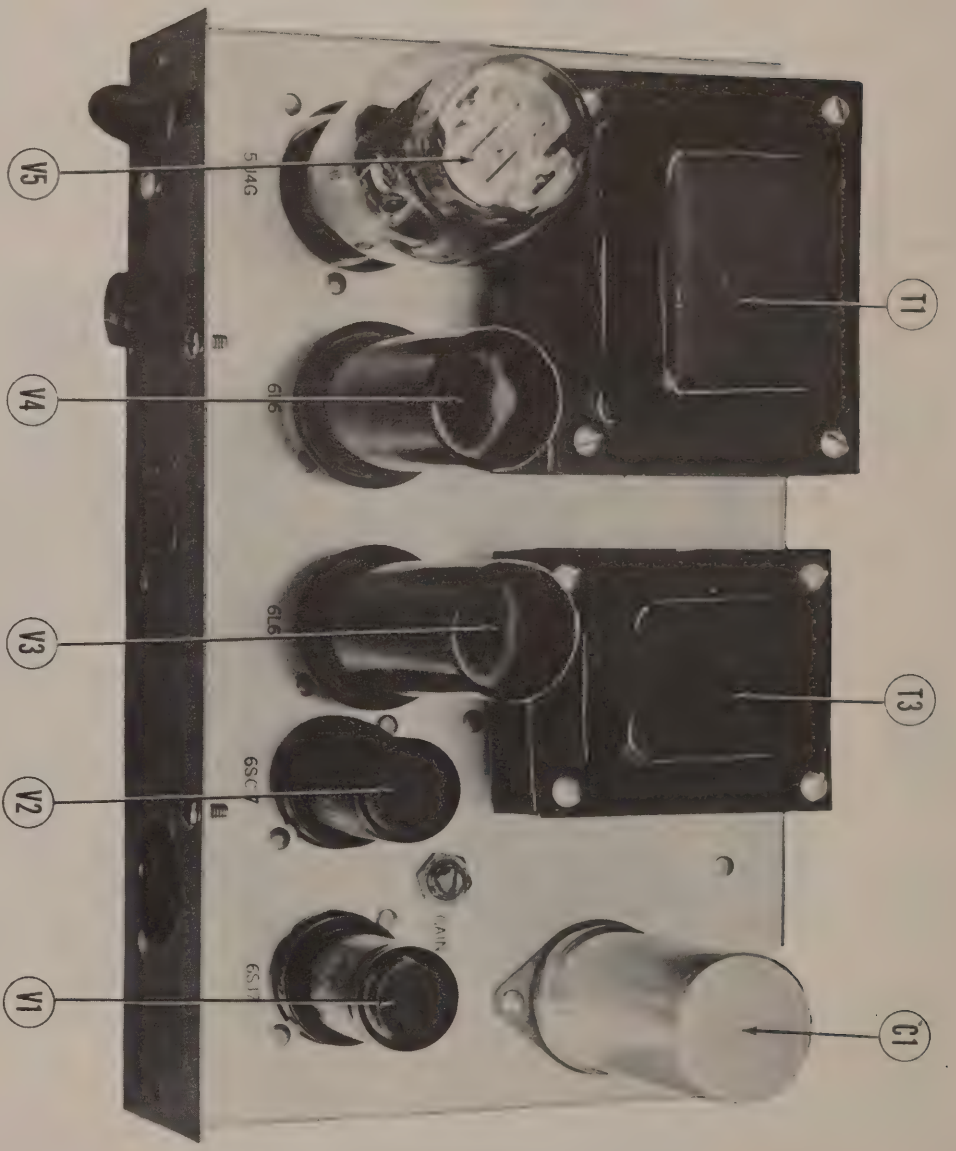
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAULAND PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	1 Meg.	½	RP-105W	Q13-137	15/16-63-Z	Gain Control
R2A	500Ω	½	RP-501B	Q11-103		Incoming Volume Control
B	Switch		Not Req.	76-1		Attach to R2A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAULAND PART No.	IRC PART No.	IDENTIFICATION CODES
R3	10Ω	½		BW-½-10	1st AF Grid
R4	68Ω	2		BW-2-68	1st AF Grid
R5	220Ω	1		BW-1-220	1st AF Grid
R6	2.2 Meg.	½		BTS-2.2 Meg.	1st AF Grid
R7	470KΩ	½		BTS-470K	1st AF Grid
R8	3300Ω	½		BTS-3300	1st AF Cathode
R9	2.2 Meg.	½		BTS-2.2 Meg.	1st AF Screen
R10	250KΩ	½		BTS-220K	1st AF Plate
R11	330KΩ	½		BTS-330K	2nd AF Grid
R12	1000Ω	½		BTS-1000	2nd AF Cathode
R13	100KΩ	½		BTS-100K	2nd AF Plate
R14	100KΩ	½		BTS-100K	Phase Inv. Plate
R15	3900Ω	½		BTS-3900	Phase Inv. Grid
R16	10KΩ	½		BTS-10K	1st AF Decoupling
R17	100KΩ	½		BTS-100K	Output Grid
R18	100KΩ	½		BTS-100K	Output Grid
R19	200Ω	10		AB-200	Output Cathode-Wire Wound
R20	4700Ω	½		BTS-4700	Filter
R21	15KΩ	2		BT-2-15K	Filter
R22	68Ω	½		BW-½-68	Tone Compensation
R23	220Ω	½		BW-½-220	Tone Compensation
R24	68Ω	½		BW-½-68	Input Transformer Shunt

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	RAULAND PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC at .71A	600VCT .095ADC	5VAC at 3A	6.3VAC at 2.6A	LP-0169	P-8013 †	P-2953 †	PH-90 †

† Add series resistor to reduce plate voltage.

TRANSFORMER (INPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	TURNS RATIO PRI. TO SEC.		DC RES. PRI.	DC RES. SEC.	RAULAND PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
T2	1 TO	20	5.8Ω CT	550Ω	LA-0043				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE PRI.	IMPEDANCE SEC.	DC RES. PRI.	DC RES. SEC.	RAULAND PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
T3	8.4KΩ CT	500Ω 250Ω 8Ω 4Ω	200Ω CT	118Ω 77Ω .7Ω .3Ω	LO-0093	A-3885 ¶	A-3128 ¶		¶ Drill new mounting holes.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V. C. IMP.	RAULAND PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	4Ω	US-0012		#	# Supplied on order. Give type and voice coil impedance.
	CONE DIA.	V. C. DIA.				
SP2	3 1/4"	9/16"				

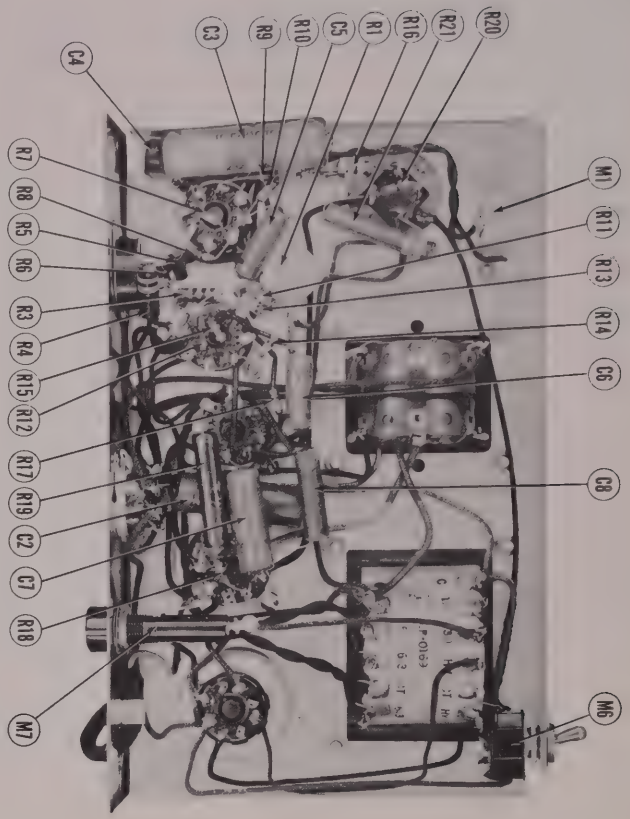
DIAL LIGHTS

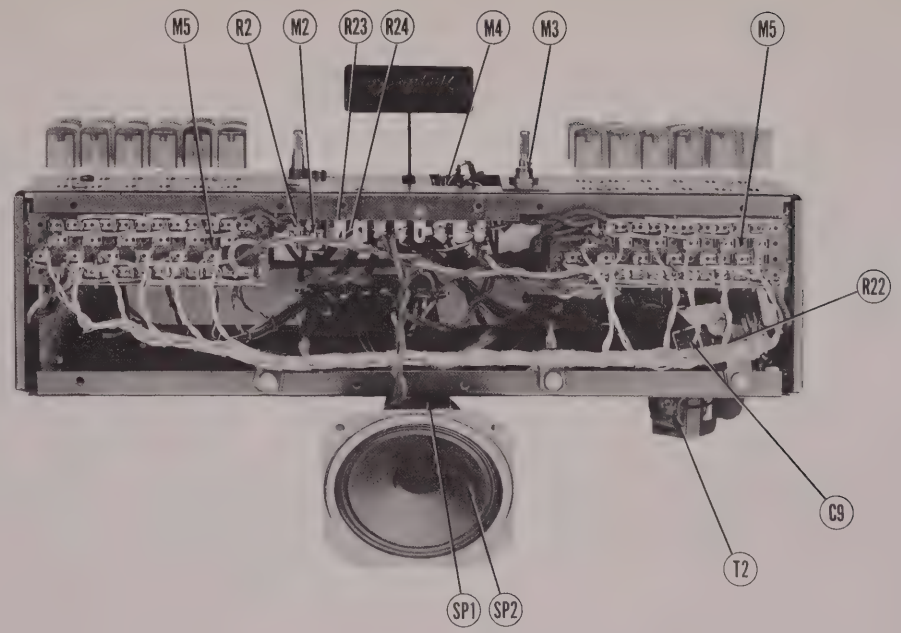
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					RAULAND PART No.		
M1	Bayonet	7.5	.2	White			Type #51
M2	Bayonet	6-8	.15	Brown			Type #47

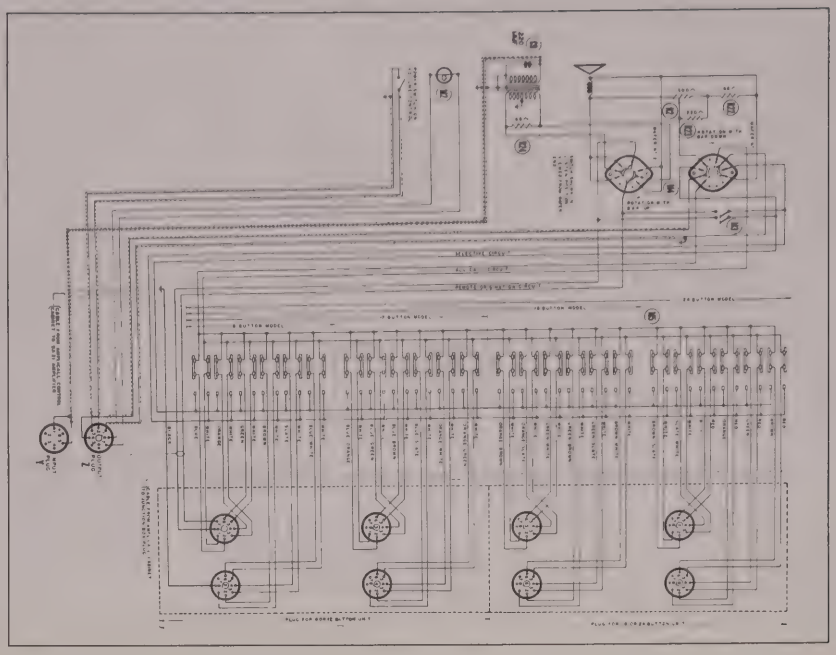
MISCELLANEOUS

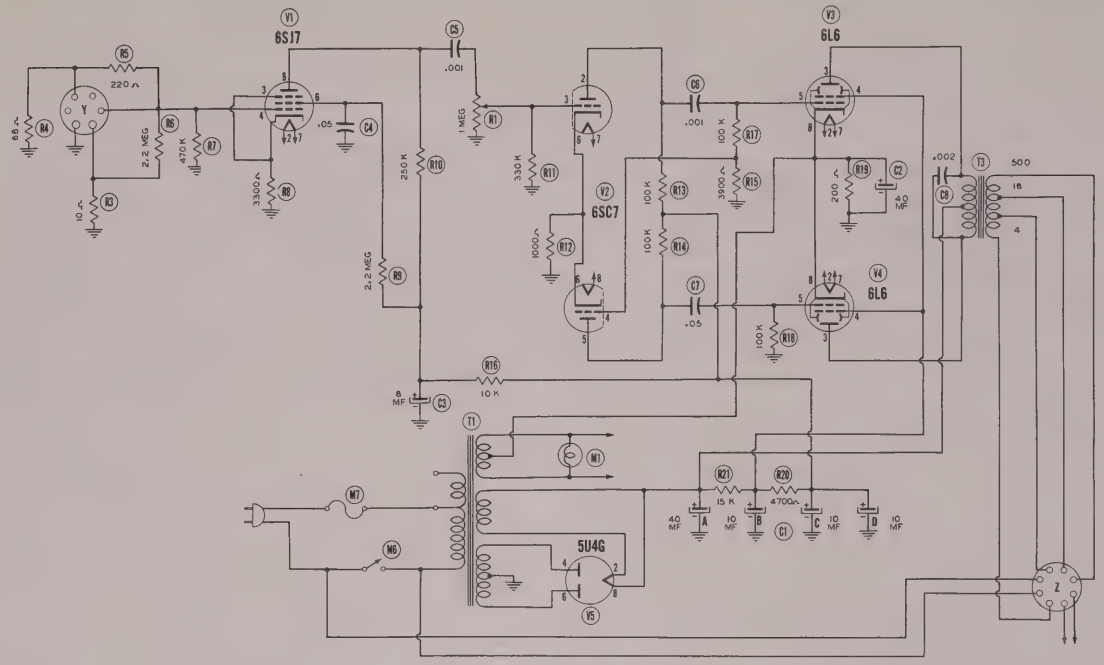
ITEM No.	PART NAME	RAULAND PART No.	NOTES
M3	Switch	X-0228	Quiet-Listen
M4	Switch	X-0205	Talk-Listen
M5	Switch		Pushbutton
M6	Switch		Power
M7	Fuse		AGC 3 Amp.

CHASSIS—BOTTOM VIEW









VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6S17	0V.	#	1.2VDC	0V.	1.2VDC	30VDC	#	120VDC
V 2	6SC7	0V.	160VDC	0V.	0V.	160VDC	1.7VDC	#	#
V 3	6L6	0V.	#	330VDC	250VDC	0V.	160VDC	#	17VDC
V 4	6L6	0V.	#	330VDC	250VDC	0V.	0V.	#	17VDC
V 5	5U4G	0V.	340VDC	0V.	310VAC	0V.	310VAC	0V.	340VDC

6.3VAC MEASURED ACROSS FILAMENTS.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6S17	0Ω	200Ω	3.3KΩ	470KΩ	3.3KΩ	†2.2Meg.	200Ω	†280KΩ
V 2	6SC7	0Ω	†120KΩ	330KΩ	4KΩ	†120KΩ	100Ω	200Ω	200Ω
V 3	6L6	0Ω	200Ω	†100Ω	†15KΩ	100KΩ	†120KΩ	200Ω	200Ω
V 4	6L6	0Ω	200Ω	†95Ω	†15KΩ	100KΩ	Inf.	200Ω	200Ω
V 5	5U4G	Inf.	80KΩ	Inf.	65Ω	Inf.	7Ω	Inf	80KΩ

† MEASURED FROM PIN 8 OF V5.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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87-10

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at minimum, no signal applied for voltage measurements.

FIG. 1

SPARTON
MODEL C-48

SPARTON
MODEL C-48

GENERAL INFORMATION

The Model C-48 record changer is designed to play, and automatically change, up to ten 10-inch or 12-inch records intermixed in any sequence desired. The unit will automatically repeat the last record until the control knob is turned to the off position.

Manufactured by
THE SPARKS-WITHINGTON CO.
2400 East Ganson Street • Jackson, Michigan

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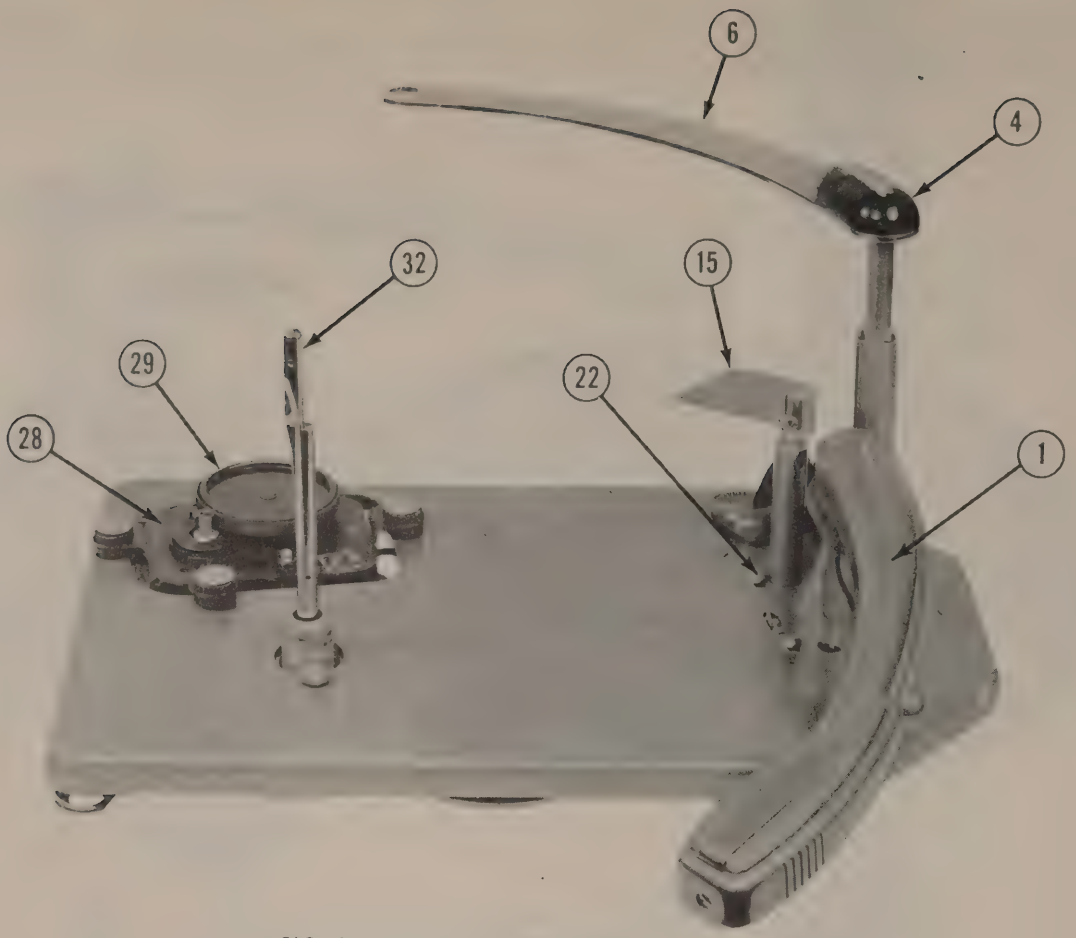

FIG. 2—TOP VIEW—LESS TURNTABLE

AUTOMATIC OPERATION

1. Lift and turn the stabilizer arm (1) to either right or left.

2. The normal position for the discriminator lever (15) is in the right-hand position (pointing away from the tone arm). When 10-inch records only are played, this lever does not have a function. However, when there are 12-inch records only, or 10 and 12-inch records intermixed, being played, the discriminator lever must be in the right-hand position to discriminate between the needle setdown point on the two size records. When this disc lever is turned from left to right, the operation should be gentle or the 12-inch mechanism will be tripped and the needle set-down point will not be correct; that is, if the first record to be played is of the 10-inch diameter.

3. Place as many as ten 10-inch or 12-inch records, in any order, on the spindle ledge (22).

4. Turn the stabilizer arm (6) back, centering it on the spindle, and lower it so that it will lie flat on the top record.

5. Turn the switch control knob (17) to the "Reject" position and release. The changer is now in automatic operation and will change and play the entire stack of records. The last record will be repeated until the changer is turned off.

6. A record may be rejected at any time, while playing, by turning the control knob to the "Reject" position, holding it momentarily and then releasing. The next record on the spindle will be lowered to the turntable and the automatic operation will be resumed.

7. To shut the changer off, turn the control knob (17) to the "Off" position and place the tone arm on the arm rest (16).

It is advisable to shut the changer off when the pickup needle is in the playing grooves of the record, rather than during the change cycle.

REMOVING RECORDS FROM TURNTABLE

1. Be sure the tone arm (1) is on the arm rest (16).
2. Lift and turn the stabilizer arm, to either right or left, to clear the records.

3. Turn the discriminator lever (15) around to the left-hand position if 12-inch records have been played.

This lever must be in the left-hand position before 12-inch records can be removed from the turntable.

4. Carefully remove the records from the turntable by lifting the records straight up the spindle.

CHANGE CYCLE

When the switch knob (17) is turned to the "On" position, power is supplied to the motor (28), which starts the motor and turntable revolving. The turntable hub and pinion gear are coupled direct to the power gear assembly (35) and are driven by the turntable. When the switch knob is turned to "Reject," the switch arm (60) is moved against the reject lever (49), which, in turn, pivots the trip arm assembly (52) from in front of the trip clutch (36). This allows the spring loaded trip clutch (36) to engage one of the bosses on the power gear assembly (35), thus causing the cam assembly (38) to revolve with the power gear, thereby starting the change cycle.

As the cam (38) rotates, the ejector arm assembly (44), which is connected to the cam (38), begins its travel, causing the rising bracket (44A) to engage and raise the elevator post (14); and as the elevator post moves up, it raises the tone arm.

The keeper arm (48), which raises under the 10 and 12-inch stop of the stop bracket assembly (59), latches the 12-inch stop with the discriminator catch (54). Further movement of the ejector arm (44) moves the horizontal actuating lever (44B) against the other end of the keeper arm (48), which swings the tone arm out from the record.

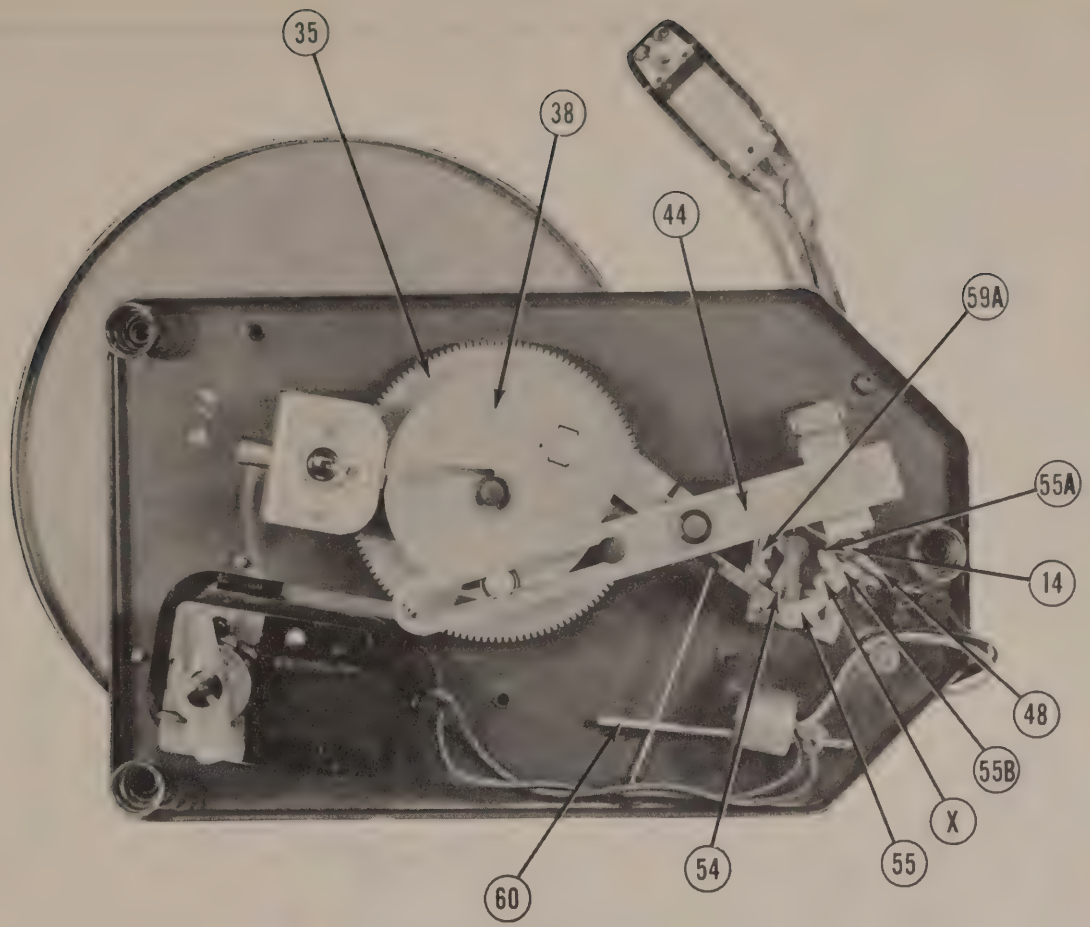

FIG. 3—BOTTOM VIEW

The roller of the spindle actuating plunger pin, riding around the edge of the cam (38), now actuates the spindle assembly (32), dropping a record to the turntable. The normal position for the tone arm to set down, when it comes in over the record, is approximately 4 13/16" from the center of a 10-inch record, as the 10-inch stop of the bracket assembly (59) is always down and engages the keeper arm (48). However, if a 12-inch record has been lowered on to the turntable, the discriminator lever (15) has been tripped by the outer edge of the record and the 12-inch stop has been released. Since the 12-inch stop is longer than the 10-inch stop, it will drop in front of the 10-inch stop. The keeper arm (48) will now contact the 12-inch stop, which, as a result, positions the tone arm for set down at approximately 5 13/16" between needle and the center of the record, which is correct for a 12-inch record. The discriminator lever (15) must be in the right-hand position (*pointing away from the pickup* arm) when playing 12-inch records.

As the cam continues to rotate, the elevator post (14) rides down the rising bracket (44A), lowering the tone arm to the record.

The trip catch (36) is now disengaged from the power gear assembly (35) as it comes in contact with the trip arm assembly (52). This allows the power gear assembly (35), pinion gear and turntable hub, turntable and motor to revolve free of the change mechanism.

The roller of the spindle actuating plunger pin moves into a recess on the cam assembly (38), which holds the cam in a neutral position while a record is being played. This completes the change cycle.

ADJUSTMENTS

Skip Adjustment on 10-Inch Records

If the tone arm sets down on the record in proper position, then skips or slides across the first few grooves of the record when starting to play, this indicates that the keeper assembly is not properly adjusted. *See Fig. 3* for parts identification.

With the keeper arm (48) in against the 10-inch stop (59A), the lug on the keeper washer (55A) should be firmly against the keeper arm (48) and the keeper (55) should be firmly against the tone arm stop. If these points do not coincide, the adjusting screw (55B) will have to be loosened and the keeper (55) will have to be moved forward or backward until the adjustment is correct.

Tone Arm Positioning

If the tone arm set down point is only slightly off, it may be due to the tone stop or skip adjustment not being properly set, instead of the tone arm adjustment being off. See "SKIP ADJUSTMENT ON 10-INCH RECORDS." However, if the indexing is off ¼ inch, or more, then the tone arm positioning will have to be corrected.

1. Raise the tone arm and depress the yoke (9) at the extreme end to release one of the small trunnions that fit into the holes in the tone arm. Remove the tone arm and place it on the base plate.

2. Loosen the adjusting screw (14A) just enough so that the elevator arm (12) can be moved on the post (14).

3. Replace the tone arm.

4. Place a 10-inch record on the turntable.

5. With the left hand, push up on the elevator post (14) high enough for the keeper arm (48) to engage the 10-inch stop (59A), Figure 3. While holding the mechanism in this position, using a pair of pliers, slip adjust the elevator post arm (12) with the right hand, in or out, until the landing position of the tone arm is correct.

Release the mechanism, being careful not to disturb the new setting.

6. Carefully remove the tone arm from its mounting yoke (9).

7. Raise the elevator post again until the keeper arm (48) is flush against the 10" stop (59A); while holding the keeper arm in this position, tighten the clutch adjusting screw (14A).

8. Replace the tone arm and check the adjustment.

A PHOTOFACT "EXPLODED" VIEW

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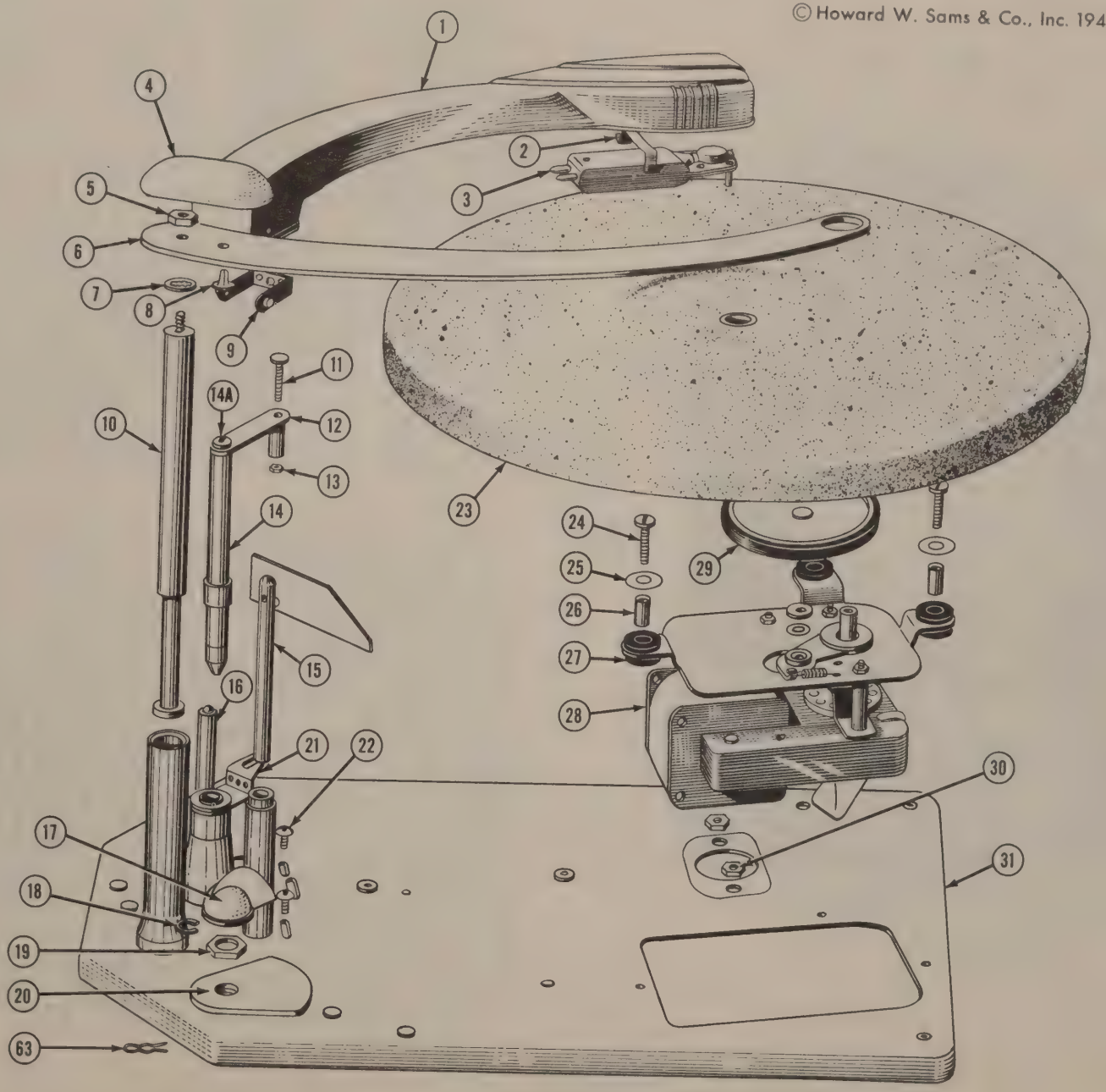

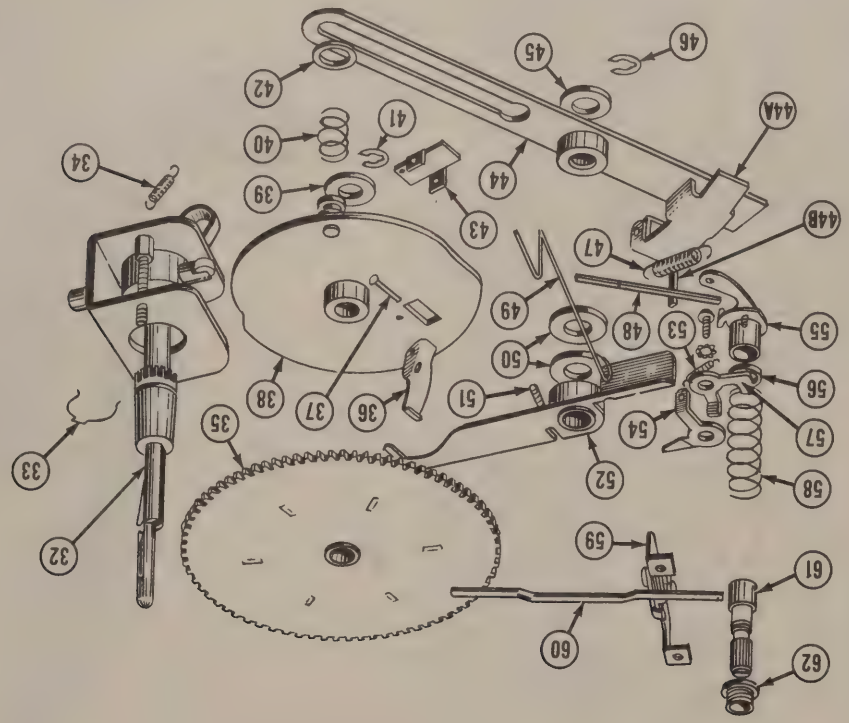
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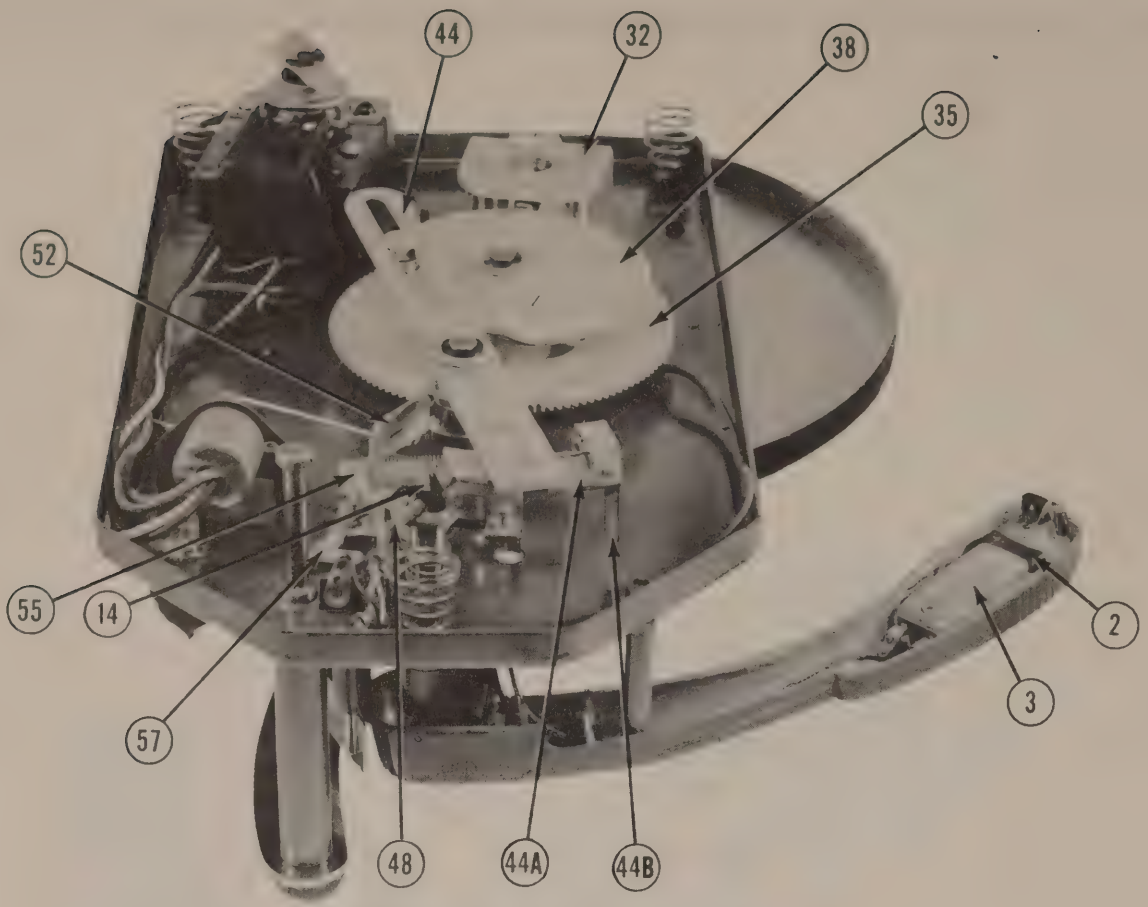

FIG. 4—SIDE VIEW

Tone Arm Height

The proper height of the tone arm (1), when it is raised above the records during the change cycle, is correct when there is approximately 1/16" clearance between the top side of the tone arm (needle end) and the underside of a record on the spindle ledge, and with the stabilizer arm resting on the record.

To make an adjustment, loosen the locknut (13) and turn the knurled head screw (11) up or down until the proper height is obtained. Tighten the locknut.

10-Inch and 12-Inch Stop Bracket Assembly

If for any reason the 10-inch bracket assembly (59) has been replaced or moved from its original position, the following adjustment is necessary for correct positioning of the tone arm:

1. Adjust the stop bracket assembly (59) until the two screw heads (22) are centered in the base plate slots, Figure 2; then tighten slightly.

2. Lift up the 12-inch stop and latch it with the little finger on the discriminator catch (54). See Figure (3) in identifying parts. This should be checked to see that the movement is free. If these moving parts are free and work easily, tighten the two screws (22) firmly and again check the catch to see that it releases easily.

If after this adjustment is made and the set-down point is off, check the adjustment on "Tone Arm Positioning" and "Skip Adjustment on 10-Inch Records."

Discriminator Adjustment

The discriminator lever (15) must be in the right-hand position (as viewed from the switch end of the unit) for a 12-inch record to trip the mechanism when it is lowered on the spindle; however, if a 12-inch record fails to trip, or hangs on the lever, check the following adjustment: "10-Inch and 12-Inch Stop Bracket Adjustment." If the adjustment is found to be correct, the trouble may lie in the adjustment where the discriminator lever is fastened to the shaft (15). The discriminator lever is slotted at the screw hole, which permits the lever to be moved in order to increase or decrease the distance between the tip of the lever and the spindle. If some 12-inch records fail to trip the discriminator lever, the distance between the lever and the spindle should be decreased. If records hang up on the discriminator lever, increase this distance.

TROUBLES

Tone Arm Does Not Move in for Set Down

1. Spring (47) loose.

Tone Arm Set-Down Point Irregular

1. Stop bracket (59) loose. If the stop bracket is loose, the set-down point will be irregular and the discriminator (15) will not operate properly.

2. Elevator arm (12) loose on the elevator post (14). See adjustment on "Tone Arm Positioning."

3. Keeper (55) loose on the keeper washer (55A), Figure 3.

See "Skip Adjustment on 10-Inch Records."

Continuous Tripping

1. Spring (51) loose, allowing the trip arm (52) to remain in an outward position.

2. Trip arm binding (52) when moved to the trip point.

3. Switch assembly shaft (61) binding in the reject position.

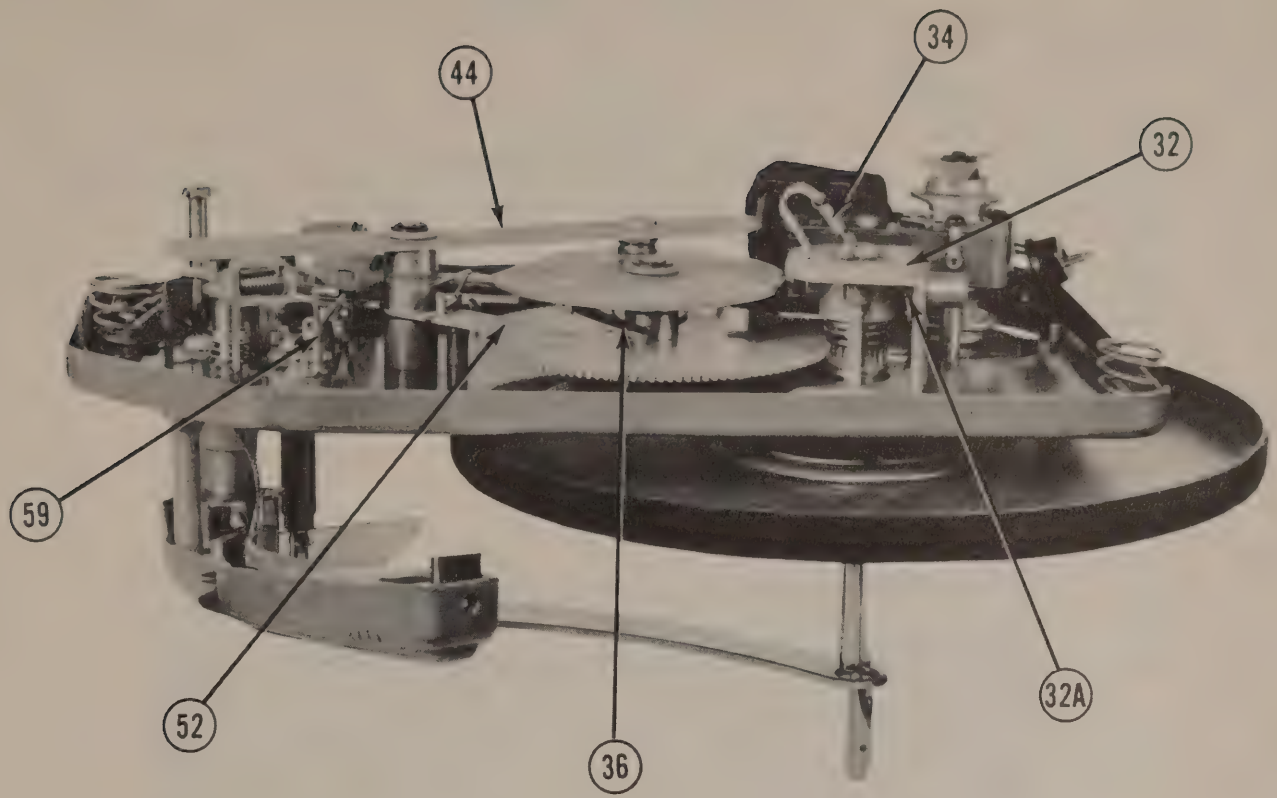

FIG. 5—FRONT VIEW

Failure to Trip

1. Trip catch (36) binding and, therefore, not engaging one of the bosses on the power gear.

2. The spring that actuates the trip catch broken.

3. Elevator arm (12) loose on the elevator post (14). If this condition is present, the post (14) and keeper arm (48) will not be actuated as the tone arm moves across the record. See the adjustment on "Tone Arm Positioning."

Records Fail to Drop Properly

1. Spring (34) loose; therefore, the ejector bar of the spindle is not returned to its home position.

2. Spindle Actuating Spring (32A) missing. Fig. 5.

Two Records Drop at a Time

1. The spindle slide in the top of the spindle is binding in a raised position. This allows more than one record to drop at a time.

2. Records too thin at the center hole.

Tone Arm Does Not Set Down for 12-Inch Records

1. The 12-inch stop of the stop bracket assembly (59) binding in a raised position.

2. Stop bracket assembly not properly adjusted. See "10-Inch and 12-Inch Stop Bracket Assembly."

3. Discriminator (15) out of adjustment. See "Discriminator Adjustment."

LUBRICATION

Lubrication applied at the time of manufacture is usually sufficient for a long period of time; however, should the changer need lubrication, due to excessive use or high-operating temperature, or when a major part or assembly is replaced, the changer should first be cleaned with carbon tetrachloride to remove all dirt, old oil and dry grease, and lubricated as follows:

Use a Good Light Grease on the Following

1. Fiber washer between power gear (15) and cam (38).
2. Elevator post (14) and housing assembly.
3. Cam roller of the spindle assembly.
4. Switch shaft assembly (61).
5. Ball bearings in spindle assembly.
6. Spindle sleeve.
7. Teeth of the power gear (35).
8. Cam face (38).
9. Elevator post bearing surface.
10. Ejector arm trunnion.

Do Not Lubricate the Following Parts

1. Tone arm hinge pin.
2. 10-Inch and 12-Inch Stop Assembly (59).
3. Discriminator catch (54).
4. Turntable rim.
5. Motor pulley.
6. Rubber on Idler Pulley (29).

CAUTION: Avoid over-lubrication. Excessive lubrication may cause parts to stick, preventing the changer from operating properly.

PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1	PA4555	Tone arm
2	PA4552	Cartridge retaining clip
3	PA4550-1	Crystal pickup
4	PA6046	Stabilizer arm knob
5		Hex nut
6	PB40600	Stabilizer arm
7		Lockwasher
8	PA1136-3	Trimount stud
9	PA4551	Tone arm yoke
10	PA6032	Stabilizer rod
11	PA6084	Height adjusting screw No. 4-40 x 11/16 —special
12	PA6040	Elevator arm
13	PA401-5	Hex nut No. 4-40
14	PA6013	Elevator post
14A	PA108-86	Screw No. 8-32 x 3/8" clutch head
15	PA6079	Discriminator lever
16	PA6052	Tone arm rest
17	AA6325-1	Switch knob
18		"C" washer
19	PA401-28	Nut 3/8-32
20	PA6045	Switch escutcheon
21		Pivot arm post
22	PA108-62	Screw No. 6-32 x 1/8
23	PC61102	Turntable
24		Motor mounting screw
25		Motor mounting washer
26		Motor mounting spacer
27		Motor mounting grommet
28	PC61101-1	Motor (60 cycle)
	PC61101-2	Motor (110 volt, 50 cycle)
29	PA4553	Idler wheel
30	PA401-14	Hex nut No. 8-32
31		Base plate
*32	AB40700-1	Center spindle and bracket assembly
32A	PA6063	Actuator spring
33		Hairpin clip (part of 32)
34	PA6023	Ejector bar spring
*35	AA6300-1	Power gear assembly
36	PA6072	Trip catch
	PA6025	Trip catch spring
37		Pivot pin—trip catch
*38	AA6305-1	Cam assembly
39	PA708-5	Fiber washer—.062 x .319 x 5/8
40	PA6082	Spring
41	PA6061	"C" washer
42	PA700-42	Steel washer 1/16" x 25/64" x 9/16"
43		Trip catch pivot bracket
*44	AA6306-1	Ejector arm assembly
	PA6021	Ejector arm spring
45	PA708-5	Fiber washer .062 x .319 x 5/8
46	PA6061	"C" washer
47	PA6042	Keeper arm spring
48	PA6038	Keeper arm
49	PA6070	Reject lever
50	PA708-5	Fiber washer .062 x .319 x 5/8
51	PA6035	Trip arm spring
*52	AA6304-1	Trip arm assembly
53	PA6035	Disc and control lever spring
54	PA6004	Discriminator catch
*55	AA6318-1	Keeper and bushing assembly
56	PA6078	Elevator post spacer
57	PB40603	Discriminator shaft lever
58	PA6082-1	Elevator post spring
*59	AA6308-1	Stop bracket assembly
60	PA6008	Switch arm
61	AA6301-1	Switch assembly shaft

*Supplied only as complete assemblies.

PHOTOFACT* Folder

STARRETT MODEL "NATHAN HALE"

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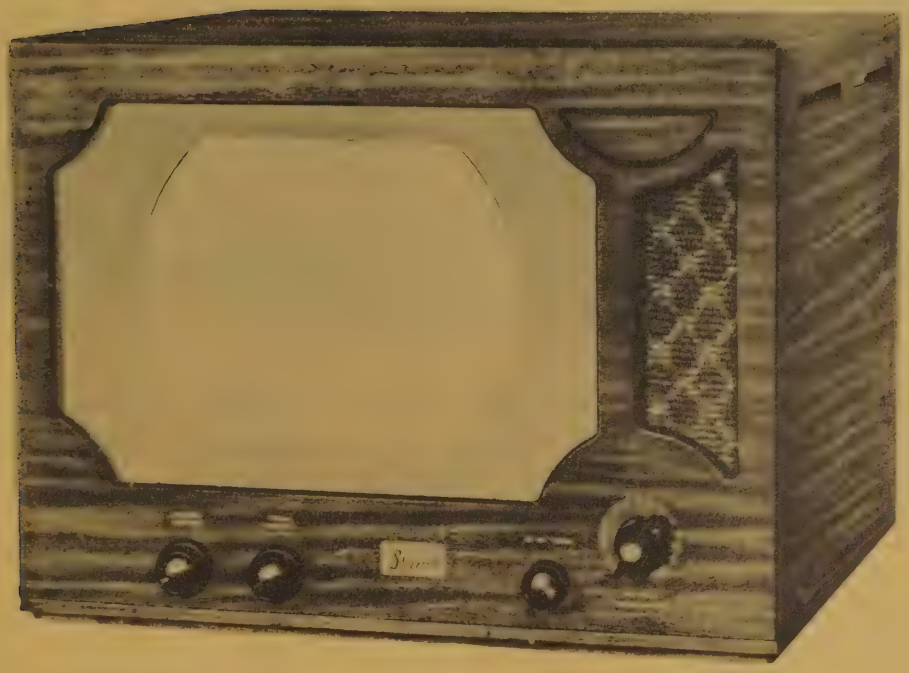

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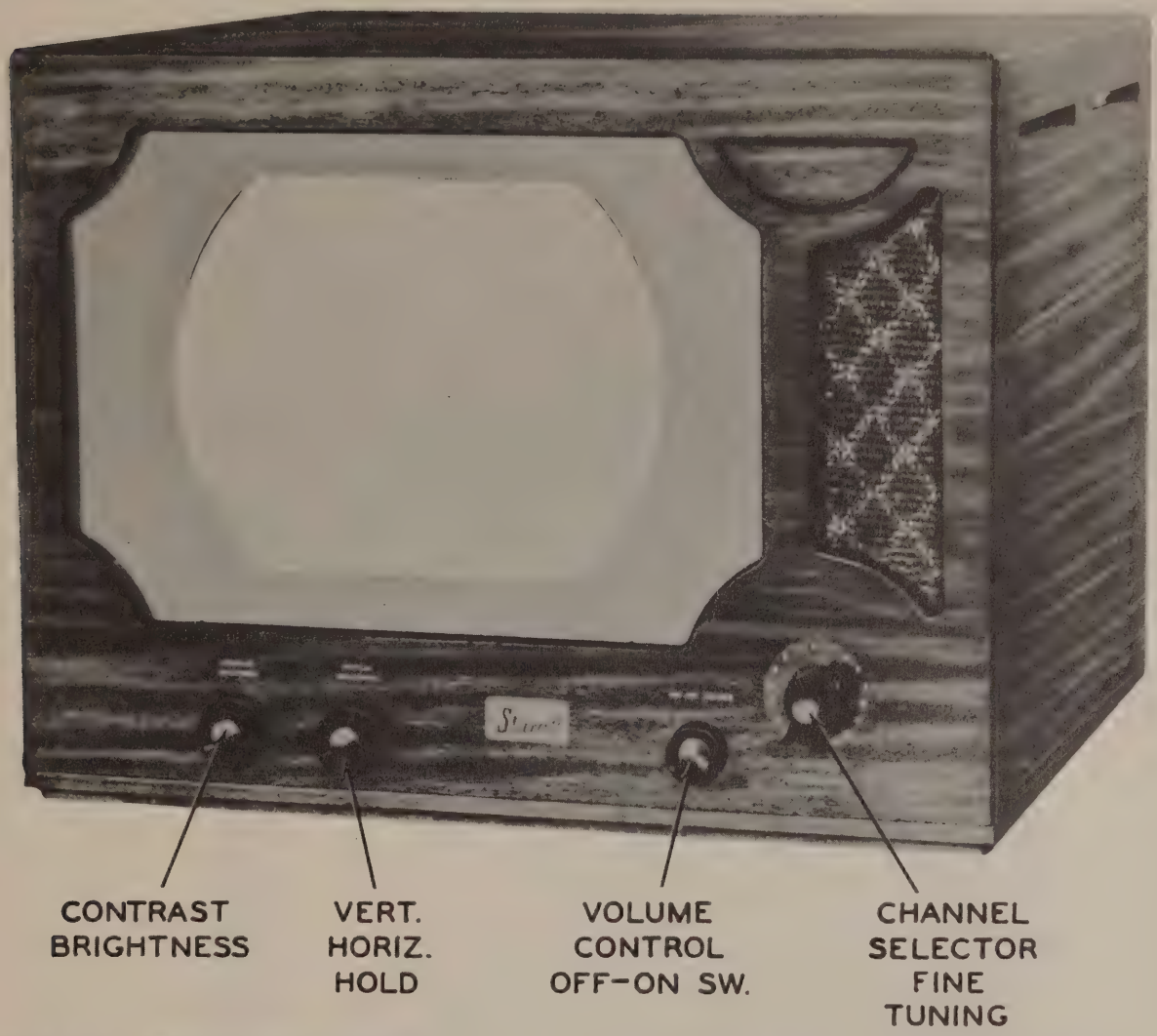

STARRETT
MODEL "NATHAN HALE"

TRADE NAME	Starrett, Model "Nathan Hale"
SUPPLIER	Starrett Televison Corp., 601 W. 25th St., New York, New York
TYPE SET	Television Receiver
TUBES	Twenty
POWER SUPPLY	110-120 Volts AC-60 Cycle
RATING	1.92 Amp. at 117 Volts AC
TUNING RANGE—	Channels 2 thru 13

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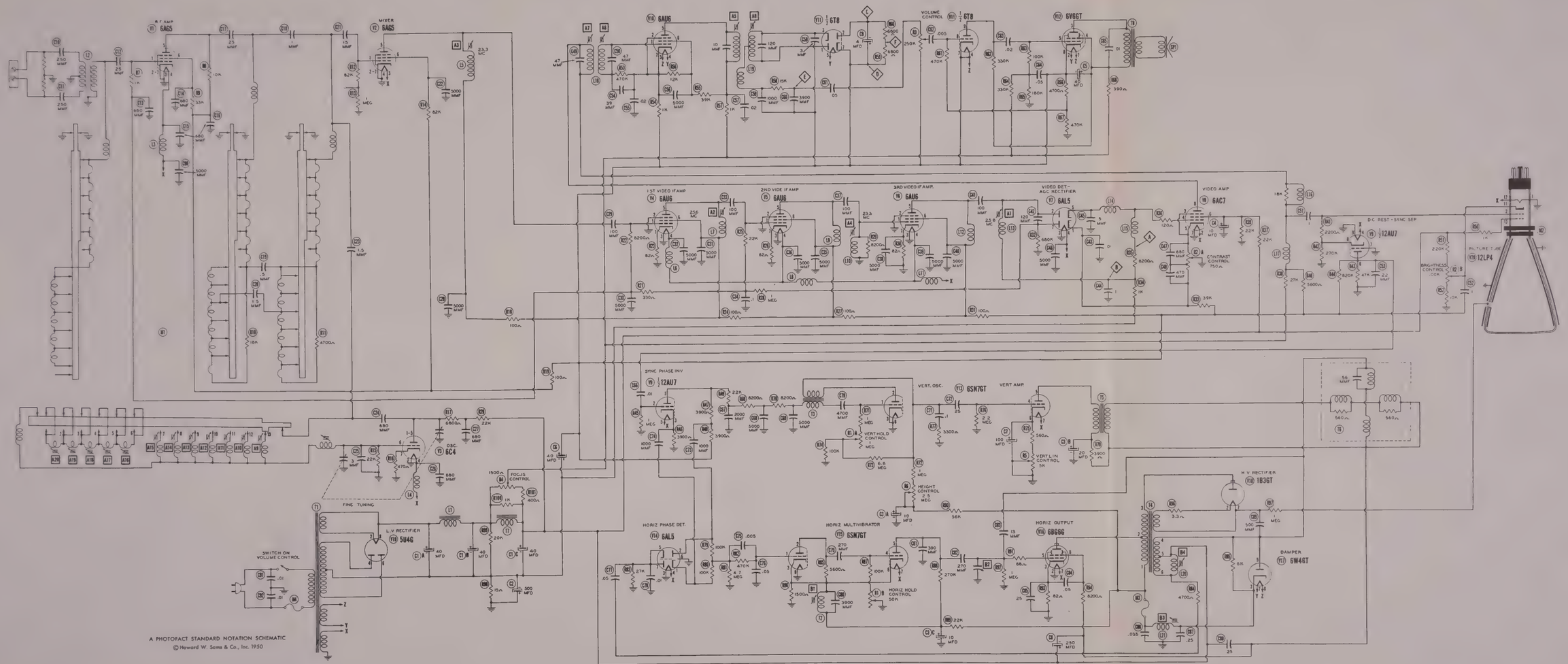

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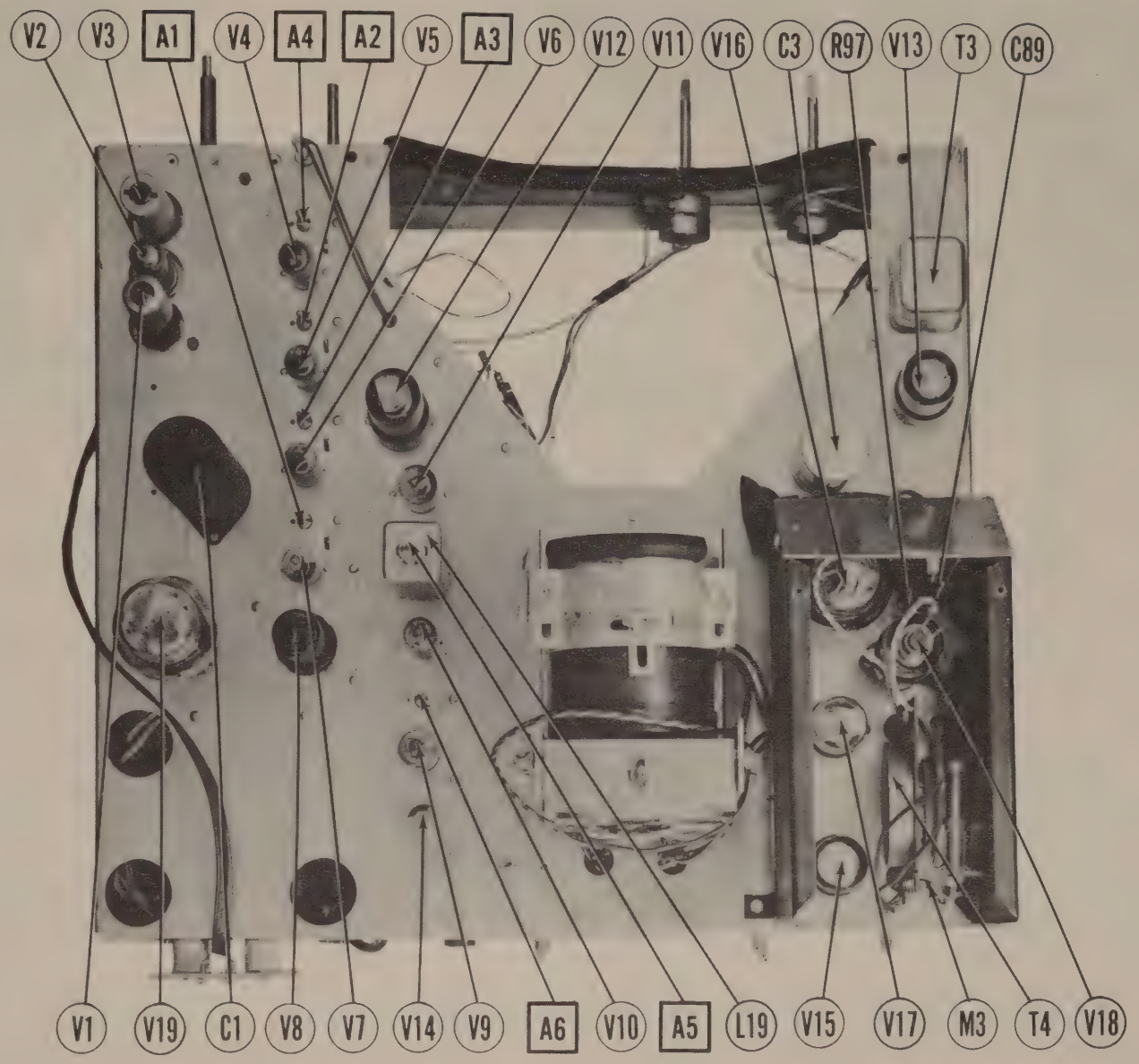
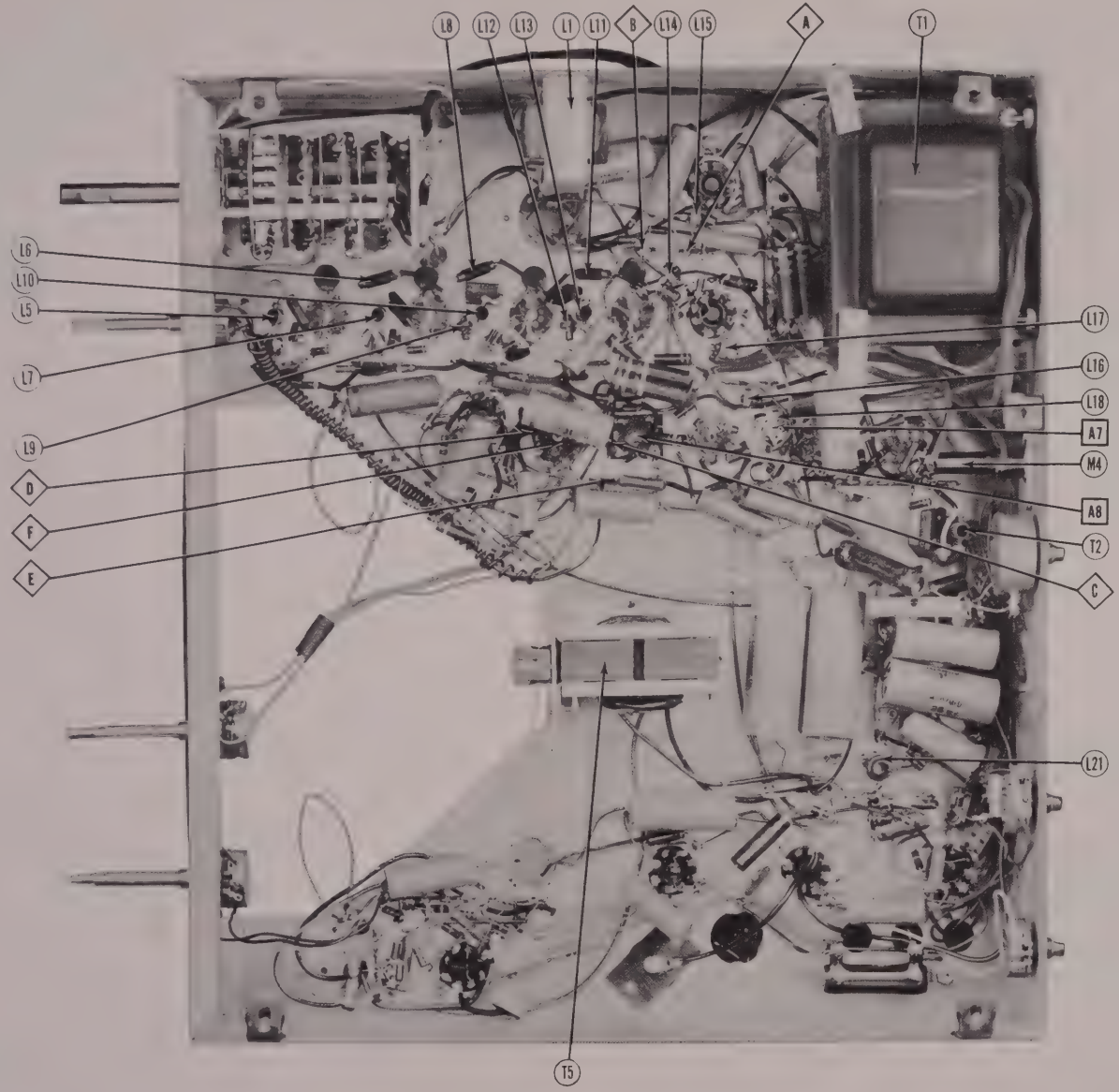
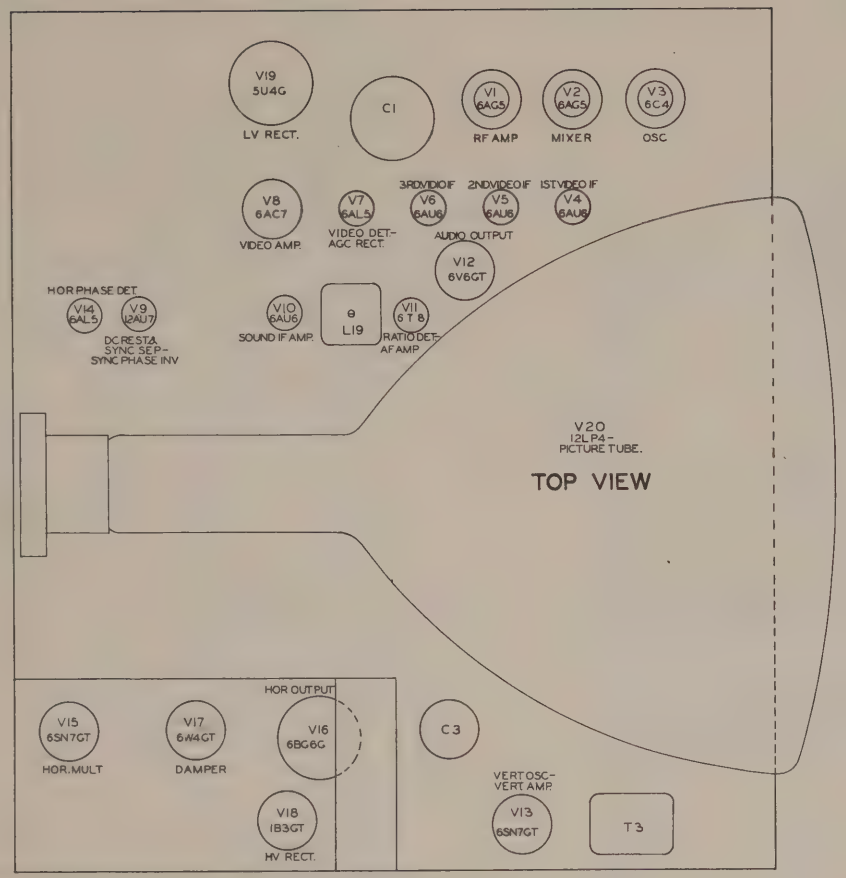


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



TUBE PLACEMENT CHART

STARRETT
MODEL "NATHAN HALE"

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If set is to be aligned with picture tube removed, remove the horizontal oscillator tube (V15) to remove high voltage shock hazard.

VIDEO IF ALIGNMENT

Remove local oscillator tube V3 to prevent erroneous indications.
Keep contrast control as low as possible to get an indication on VTVM (Approximately 2 volts).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	25.6MC (Unmod.)	Any	DC Probe to Point (A) Common to Point (B)	A1, A2	Adjust for maximum deflection.
2.		"	23.3MC	"	"	A3, A4	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	24MC (10MC SWP)	23.3MC 25.6MC	Any	Vert. Amp. to Point (A) Low side to chassis.		Check for response curve as per Fig 1 with markers as shown. If necessary slightly retouch A1, A2, A3, A4 for proper response.

SOUND IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	.01MFD	High side to pin 4 (Grid) of 6AC7 (V8). Low side to chassis.	4.5MC (Unmod.)	Any	DC Probe to Point (C) Common to Point (D)	A5, A6, A7	Adjust for maximum deflection.
5.	.01MFD	"	"	"	DC Probe to Point (E) Common to Point (F)	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

OSCILLATOR ALIGNMENT

RF and mixer lines are pre-set at the factory and should not require adjustment in the field.
Replace local oscillator tube V3. Set the fine tuning control to mid-position.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 150Ω carbon res.	Across antenna terminals with 150Ω in each lead.	213MC (10MC SWP)	211.25MC 215.75MC	13	Vert. Amp. to Point (A) Low side to chassis.	A9	Check for proper response as per Fig 2. Since the oscillator circuits for each channel are individually tuned, only those channels requiring alignment need be adjusted.
			207MC (10MC SWP)	205.25MC 209.75MC	12		A10	
			201MC (10MC SWP)	199.25MC 203.75MC	11		A11	
			195MC (10MC SWP)	193.25MC 197.75MC	10		A12	
			189MC (10MC SWP)	187.25MC 191.75MC	9		A13	
			183MC (10MC SWP)	181.25MC 185.75MC	8		A14	
			177MC (10MC SWP)	175.25MC 179.75MC	7		A15	
			85MC (10MC SWP)	83.25MC 87.75MC	6		A16	
			79MC (10MC SWP)	77.25MC 81.75MC	5		A17	
			69MC (10MC SWP)	67.25MC 71.75MC	4		A18	
			63MC (10MC SWP)	61.25MC 65.75MC	3		A19	
			57MC (10MC SWP)	55.25MC 59.75MC	2		A20	

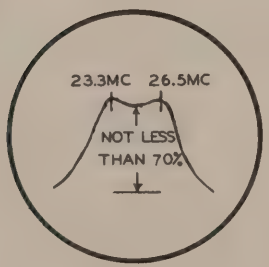


FIG. 1

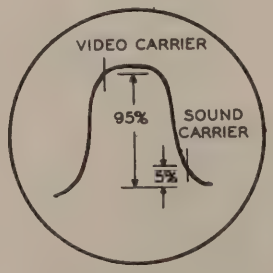
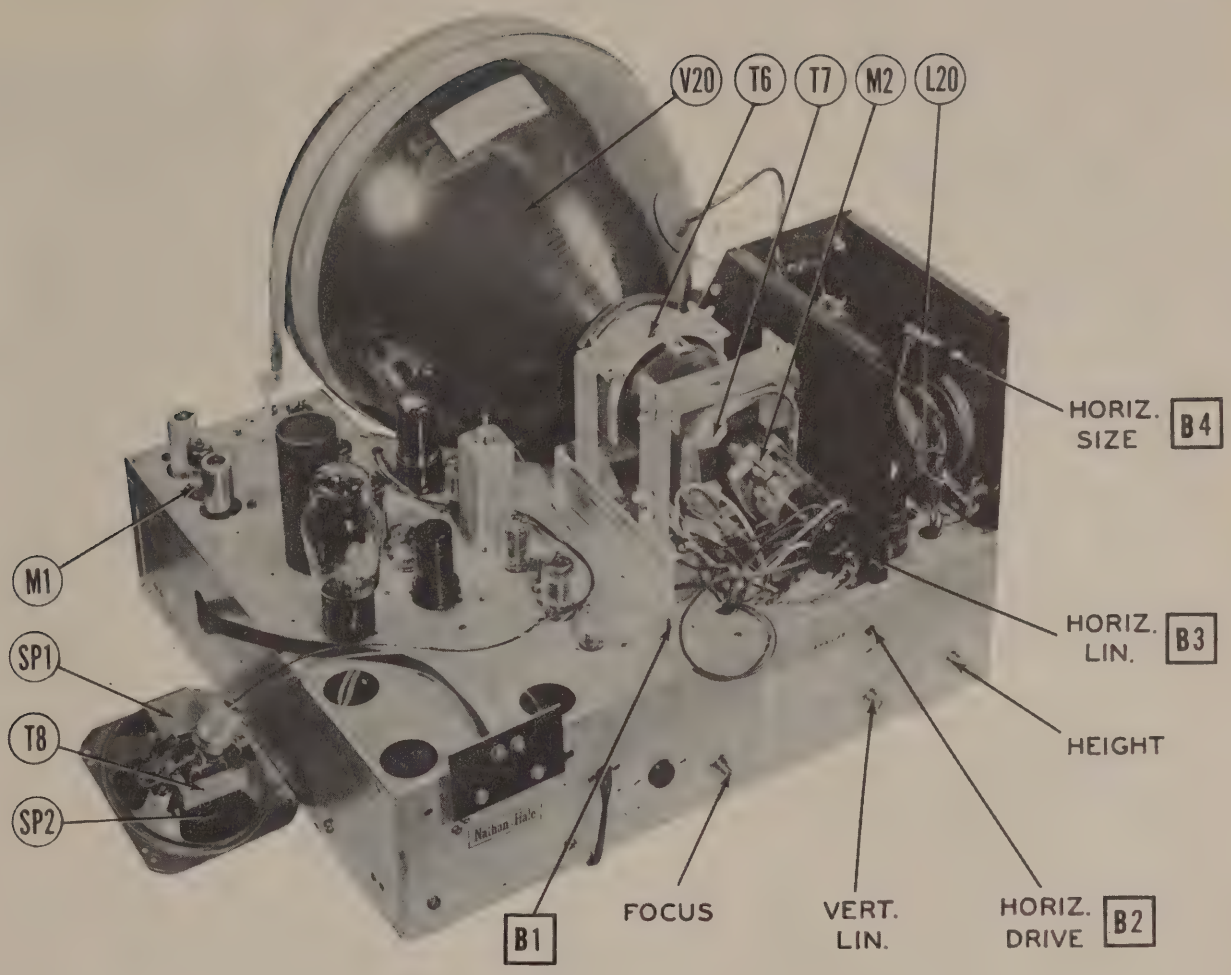


FIG. 2



CHASSIS–TOP VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the horizontal hold control to mid-position and adjust B1 until picture syncs normally in horizontal plane.

Adjust B2 clockwise as far as possible without crowding the left hand side of the test pattern.

Adjust B3 and B4 for proper size and best linearity of test pattern horizontally. Slight readjustment of B2 may be necessary.

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.4VDC	0V.	0V.	6.3VAC	95VDC	85VDC	0V.		
V 2	6AG5	-1.2VDC	0V.	6.3VAC	0V.	135VDC	75VDC	0V.		
V 3	6C4	†150VDC	0V.	0V.	6.3VAC	†150VDC	§-2.5VDC	4.2VDC		
V 4	6AU6	-.4VDC	0V.	0V.	6.3VAC	135VDC	135VDC	.8VDC		
V 5	6AU6	-.4VDC	0V.	0V.	6.3VAC	135VDC	135VDC	.8VDC		
V 6	6AU6	0V.	0V.	0V.	6.3VAC	135VDC	135VDC	1 2VDC		
V 7	6AL5	.2VDC	-2.6VDC	0V.	6.3 VAC	0V	0V.	- 6VDC		
V 8	6AC7	0V.	6.3VAC	2VDC	-2VDC	2VDC	165VDC	0V.	175VDC	
V 9	12AU7	130VDC	0V.	6.8VDC	6.3VAC	6.3VAC	6.2VDC	0V.	1.3VDC	0V.
V 10	[illegible]	1.2VDC	6.4VDC	†0V	†6.3VAC	230VDC	60VDC	6.4VDC		
V 11	6T8	†-.3VDC	†-.6VDC	†-.4VDC	†0V.	†6.3VAC	†0V.	†0V	†-.7VDC	†90VDC
V 12	[illegible]V6GT	0V.	†6.3VAC	†215VDC	†225VDC	†-11VDC	0V.	†0V.	†0V	
V 13	6SN7GT	-14VDC	100VDC 205VDC	0V.	.1VDC	320VDC	9VDC 20VDC	6.3VAC	0V.	
V 14	6AL5	2.3VDC	-1.4VDC	0V.	6.3VAC	0V.	0V.	0V.		
V 15	6SN7GT	.2VDC	300VDC	12VDC	-3.8VDC	130VDC	12VDC	6.3VAC	0V.	
V 16	6BG6G	-2.9VDC	0V.	7.4VDC	0V.	-2.9VDC	0V.	6.3VAC	280VDC	TOP CAP *
V 17	6W4GT	0V.	0V.	480VDC	0V.	400VDC	0V.	†6.3VAC	†0V.	
V 18	1B3GT	* DO NOT MEASURE								
V 19	5U4G	0V.	440VDC	0V.	420VAC	6V.	420VAC	0V.	440VDC	
V 20	12LP4	0V.	1.2VDC	PIN 10 400VDC	PIN 11 115VDC	PIN 12 6.3VAC				

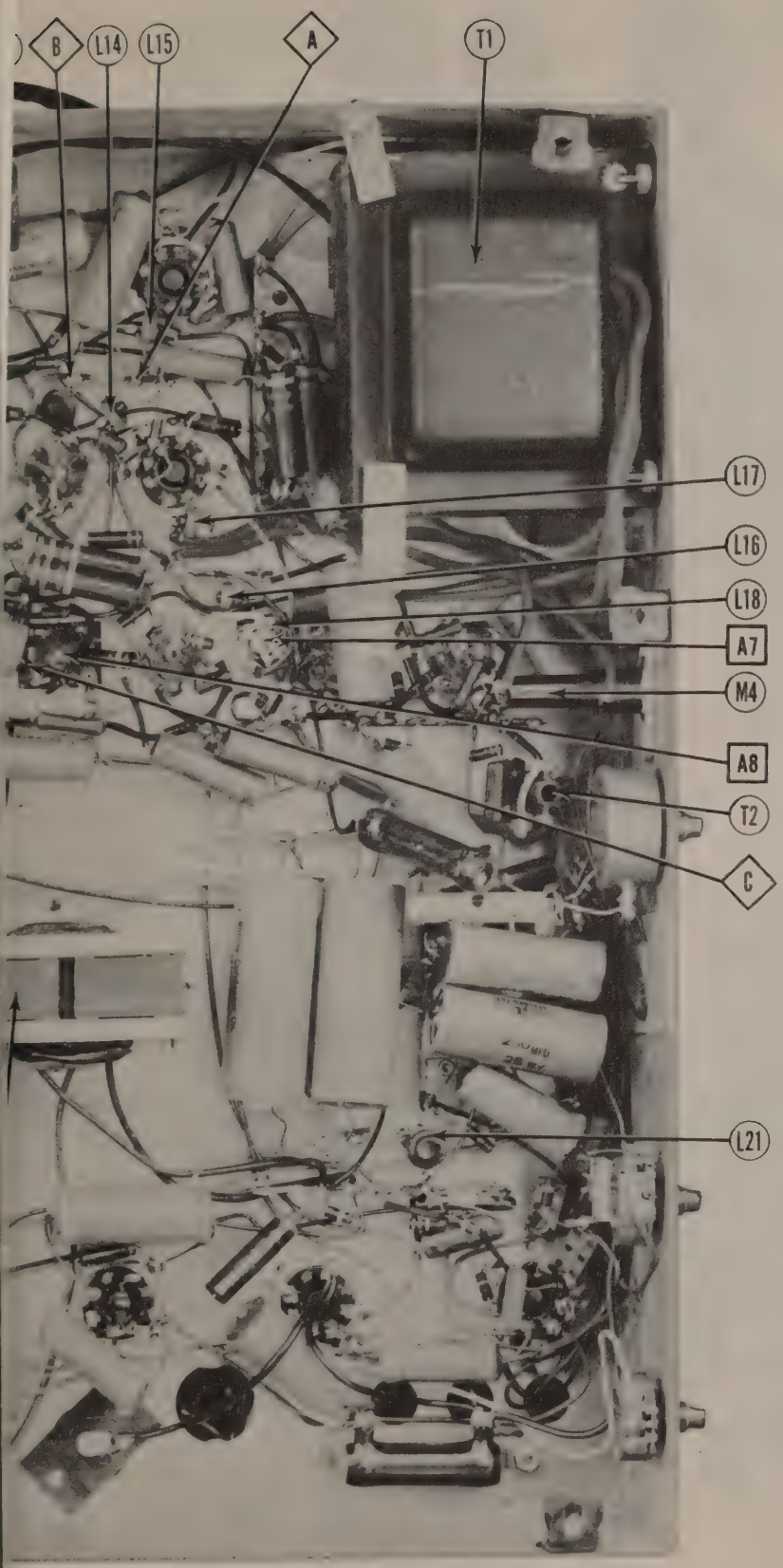
§ TAKEN WITH VACUUM TUBE VOLTMETER.
† MEASURED FROM PIN 8 OF V12.
* DO NOT MEASURE.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	1.6Meg.	0Ω	0Ω	.1Ω	†10KΩ	†33KΩ	0Ω		
V 2	6AG5	1 Meg.	0Ω	.1Ω	0Ω	†460Ω	†82KΩ	0Ω		
V 3	6C4	#30KΩ	Inf.	0Ω	.1Ω	#30KΩ	22KΩ	470Ω		
V 4	6AU6	1.6Meg.	0Ω	0Ω	.1Ω	†300Ω	†300Ω	82Ω		
V 5	6AU6	1.6Meg.	0Ω	0Ω	.1Ω	†200Ω	†200Ω	82Ω		
V 6	6AU6	.2Ω	0Ω	0Ω	.1Ω	†100Ω	†100Ω	82Ω		
V 7	6AL5	36Ω	1000Ω	0Ω	.1Ω	9KΩ	Inf.	680KΩ		
V 8	6AC7	Inf.	.1Ω	700Ω	9KΩ	700Ω	#15KΩ	0Ω	†5.6KΩ	
V 9	12AU7	†7.8KΩ	1 Meg.	3.9KΩ	.1Ω	.1Ω	47KΩ	0Ω	[illegible]70KΩ	0Ω
V 10	6AU6	†470KΩ	†900Ω	†0Ω	†.1Ω	#1.4KΩ	†12KΩ	†900Ω		
V 11	6T8	Inf.	†13.5KΩ	Inf.	†0Ω	†.1Ω	†0Ω	†0Ω	470KΩ	#330KΩ
V 12	6V6GT	Inf.	†.1Ω	†1000Ω	†800Ω	280KΩ	Inf.	†0Ω	†0Ω	
V 13	6SN7GT	2 Meg.	#2.5 Meg. #1 Meg.	0Ω	2.2Meg.	#4.5KΩ	5.5KΩ 560Ω	.1Ω	0Ω	
V 14	6AL5	4.8Meg.	4.8Meg	0Ω	.1Ω	27KΩ	0Ω	27KΩ		
V 15	6SN7GT	5.1Meg.	#27KΩ	1.5KΩ	150KΩ	#290KΩ	1.5KΩ	.1Ω	0Ω	
V 16	6BG6G	1 Meg.	0Ω	82Ω	Inf.	1 Meg.	Inf.	.1Ω	#9KΩ	TOP CAP #6KΩ
V 17	6W4GT	Inf.	Inf.	#6KΩ	Inf.	#200Ω	Inf.	†.1Ω	†0Ω	
V 18	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP #6KΩ
V 19	5U4G	Inf.	10KΩ	Inf.	65Ω	Inf.	70Ω	Inf.	10KΩ	
V 20	12LP4	0Ω	300KΩ	PIN 10 #1000Ω	PIN 11 70KΩ	PIN 12 .1Ω				

† MEASURED FROM PIN 8 OF V12.
# MEASURED FROM PIN 2 OF V19.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



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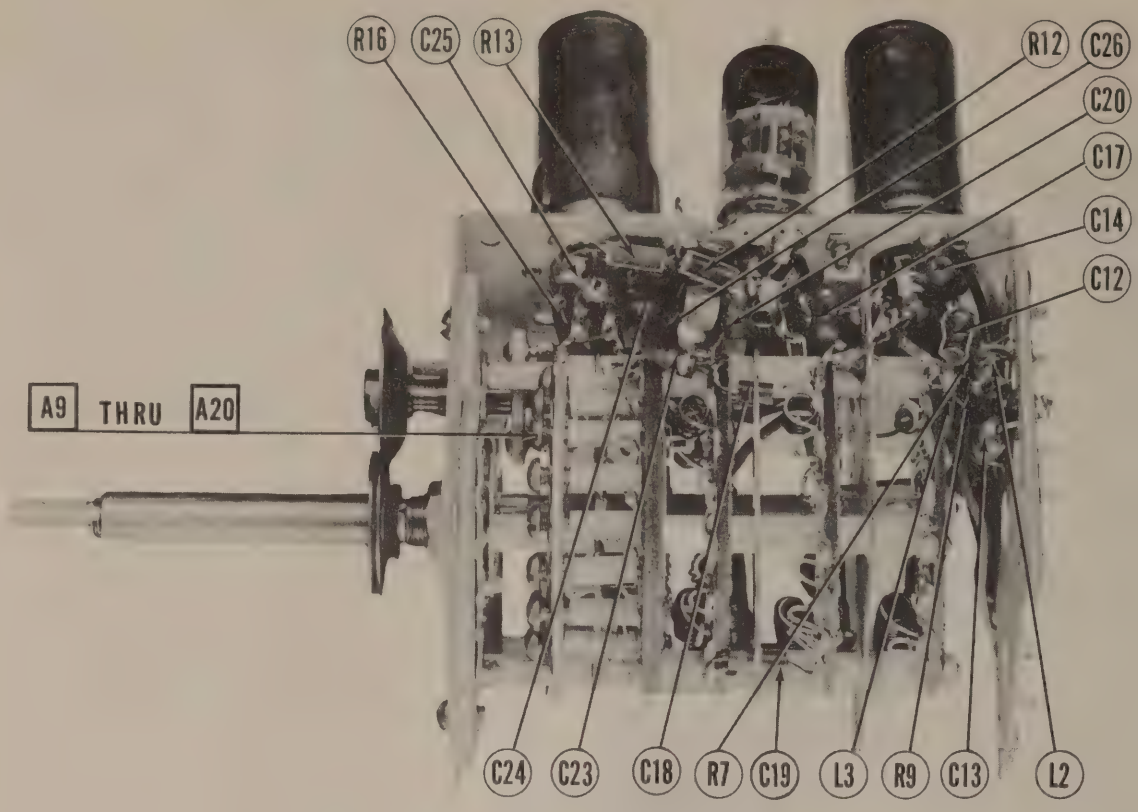
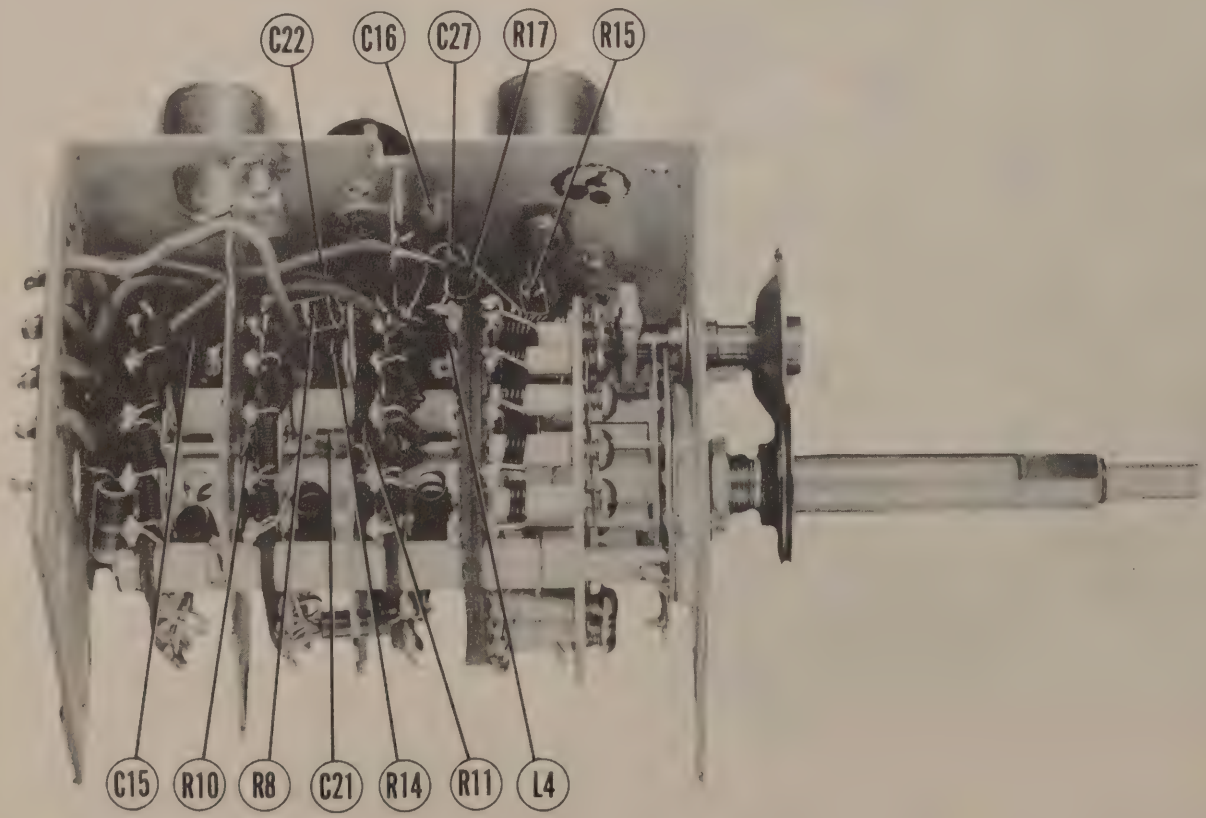
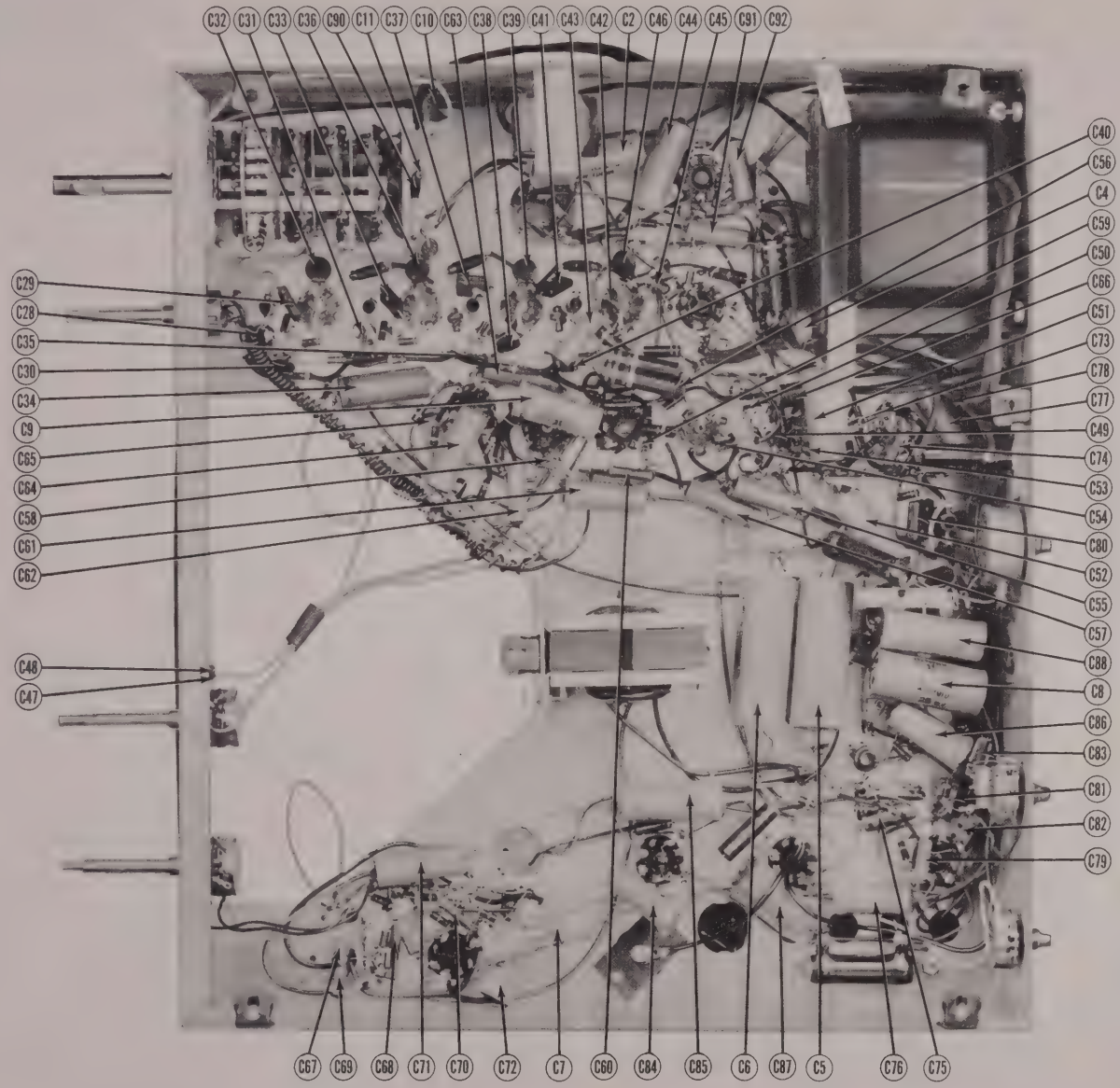


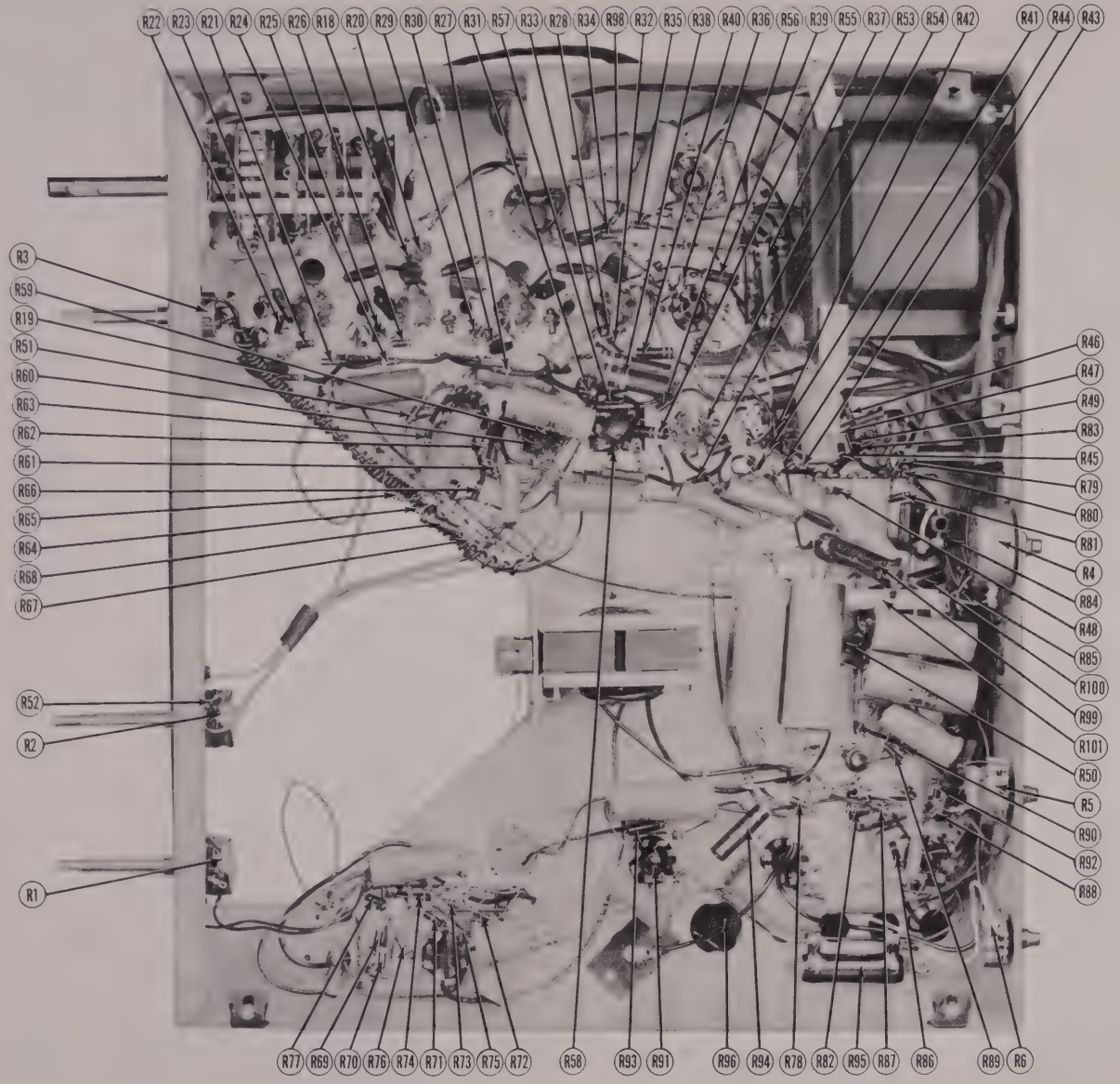
RF TUNER-RIGHT SIDE



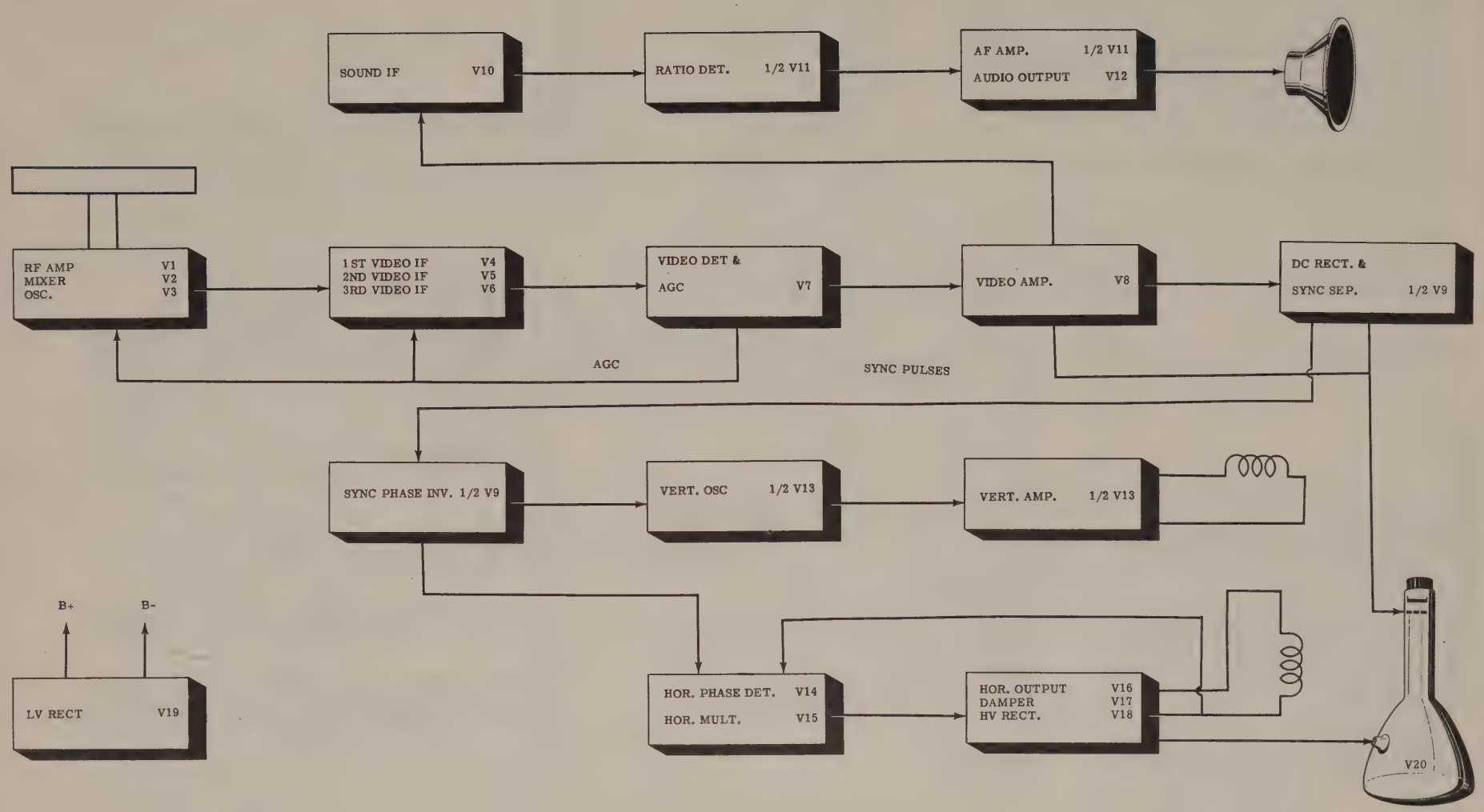
RF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



BLOCK DIAGRAM

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Mixer	6AG5	6AG5	7BD	
V3	Oscillator	6C4	6C4	6BG	
V4	1st Video IF	6AU6	6AU6	7BK	
V5	2nd Video IF	6AU6	6AU6	7BK	
V6	3rd Video IF	6AU6	6AU6	7BK	
V7	Video Det. -AGC Rectifier	6AL5	6AL5	6BT	
V8	Video Amp.	6AC7	6AC7	8N	
V9	DC Restorer-Sync. Sep. -Phase Inv.	12AU7	12AU7	9A	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11	Ratio Det. -AF Amp.	6T8	6T8	9E	
V12	Audio Output	6V6GT	6V6GT	7AC	
V13	Vert. Osc. -Vert. Amp.	6SN7GT	6SN7GT	8BD	
V14	Hor. Phase Det.	6AL5	6AL5	6BT	
V15	Hor. Multivibrator	6SN7GT	6SN7GT	8BD	
V16	Hor. Output	6BG6G	6BG6G	5BT	
V17	Damper	6W4GT	6W4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	
V20	Picture Tube	12LP4	12LP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450		AF888J	UP1CJ1098		TVL-304	▲ Filter
B	40	450						■ Filter
C	40	450						● Filter
C2	500	5		PRS6/500	BRH605		TVA-27	Bias Filter
C3A	10	450		AF2222J †	UP7CJ1106		EL-410 †	● Decoupling
B	20	450						■ Vert. Amp. Decoupling
C	10	450						▲ Decoupling
C4	10	150		PRS150/12	BR1015		UT-121	Video Amp. Screen Bypass
C5	40	350		PRS450/40	BR4035		TVA-24	Output Plate Decoupling
C6	40	350		PRS450/40	BR4035		TVA-24	Output Cathode Bypass
C7	100	25		PRS25/100	BRH251A		TVA-8	Vert. Amp. Cathode Bypass
C8	250	25		PRS25/100§	BR2525A		TVA-9	Hor. Sweep Coupling *
C9	4	50		PRS150/4	BR550		TVA-13	Stabilizing Cap.
C10	250					GP2K-250		Ant. Coupling
C11	250					GP2K-250		Ant. Coupling
C12	25					GP1K-25		RF Coupling
C13	680					GP2K-680		AGC Filter
C14	680					GP2K-680		RF Screen Bypass
C15	680					GP2K-680		RF Filament Bypass
C16	680					GP2K-680		RF Bypass
C17	25					GP1K-25		RF Coupling
C18	1							RF Coupling
C19	.5							RF Coupling
C20	1.5					NPOK-1.5		RF Coupling
C21	15					GP1K-15		RF Coupling
C22	5000					811-005	29C1	Mixer Screen Bypass
C23	1.5					NPOK-1.5		Osc. Coupling
C24	680							Osc. Feedback
C25	3					N150K-3		Fixed Trimmer
C26	680					GP2K-680		Osc. Filament Bypass
C27	680					GP2K-680		RF Bypass
C28	5000			1467-005	1D5D5	811-005	29C1	Mixer Plate Decoupling
C29	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C30	5000			1467-005	1D5D5	811-005	29C1	AGC Filter
C31	5000			1467-005	1D5D5	811-005	29C1	1st V. IF Decoupling
C32	5000			1467-005	1D5D5	811-005	29C1	1st V. IF Fil. Bypass
C33	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C34	.1	600		P688-1	PTE6P1		TM-1	AVC Filter
C35	5000			1467-005	1D5D5	811-005	29C1	2nd V. IF Decoupling
C36	5000			1467-005	1D5D5	811-005	29C1	2nd V. IF Fil. Bypass
C37	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C38	5000			1467-005	1D5D5	811-005	29C1	3rd V. IF Cathode Bypass
C39	5000			1467-005	1D5D5	811-005	29C1	3rd V. IF Fil. Bypass
C40	5000			1467-005	1D5D5	811-005	29C1	3rd V. IF Decoupling
C41	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C42	120	500		1468-0001	5W5T1	GP2K-120	1FM-31	IF Coupling
C43	.01	600		P688-01	PTE6S1	821-01	TM-11	AGC Filter
C44	.1	600		P688-1	PTE6P1		TM-1	Bias Filter
C45	5			1468-000005	5W5V5	NPOK-5	MS-55	V. Diode Filter
C46	5000			1467-005	1D5D5	811-005	29C1	V. Det. -AGC Fil. Bypass
C47	680			1468-00075	1W5T7	GP2K-680	1FM-37	V. Amp. Cathode Bypass
C48	470			1468-0005	5W5T5	GP2K-470	1FM-35	V. Amp. Cathode Bypass
C49	47	300		1469-00005	5R5Q5	NPOM-50	MS-45	Fixed Trimmer
C50	47	300		1469-00005	5R5Q5	NPOM-50	MS-45	Fixed Trimmer
C51	.1	600		P688-1	PTE6P1		TM-1	Video Coupling
C52	.1	600		P688-1	PTE6P1		TM-1	Pic. Tube Cathode Dec.
C53	22	300		1468-000025	5W5Q25	GP1K-22	MS-425	Sync. Clipper Plate Bypass
C54	39	300		1468-00004	5W5Q4	GP1K-39	1FM-44	S. IF Coupling
C55	.02	600		P688-02	PTE6S2		TM-12	Decoupling
C56	5000			1467-005	1D5D5	811-005	29C1	S. IF Screen Bypass
C57	.02	600		P688-02	PTE6S2		TM-12	S. IF Decoupling
C58	3					NPOK-3		Fixed Trimmer
C59	1000			1468-001	1W5D1	GP2L-001	1FM-21	Diode Load Cap.
C60	3900			1467-004	1D5D4		1FM-24	De-emphasis
C61	.05	600		P688-05	PTE6S5		TM-15	Audio Coupling
C62	.005	600		P688-005	PTE6D5	811-005	TM-25	Audio Coupling

CAPACI

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMEN: STARRETT PART No.	REPLACEMEN: AEROVOX PART No.	REPLACEMEN: COR DUB PART
C63	.02	600		P688-02	PTE
C64	.05	600		P688-05	PTE
C65	.01	600		P688-01	PTE
C66	.01	600		P688-01	PTE
C67	2000			1467-002	1W5D
C68	5000			1467-005	1D5D
C69	5000			1467-005	1D5D
C70	4700			1467-005	1D5D
C71	.1	600		P688-1	PTE
C72	.25	600		684-25	GT6I
C73	1000			1468-001	1W5D
C74	1000			1468-001	1W5D
C75	.005	600		P688-005	PTE
C76	.05	600		P688-05	PTE
C77	.05	600		P688-05	PTE
C78	.01	600		P688-01	PTE
C79	270	500		1468-0003	5W5T
C80	3900	500			
C81	390	500		1468-0004	5W5T
C82	270	500		1468-00025	5W5T
C83	13	1500			
C84	.05	600		P688-05	PTE
C85	.25	600		684-25	GT6I
C86	.035	600		P688-033	
C87	.25	600		684-25	GT6I
C88	.25	600		684-25	GT6I
C89	500	10000			
C90	5000			1467-005	1D5D
C91	.01	600		P688-01	PTE
C92	.01	600		P688-01	PTE

* Not used in all models.
† Some models use 330MMF in this application.
‡ Parallel sections to obtain desired capacity.
§ Use two in parallel.

CC

ITEM No.	RATING: RESIST-ANCE	RATING: WATTS	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: IRC PART No.	CLA PA
R1A	1 Meg.	1/2		B11-137 *	
B	50KΩ	1/2		B11-123 *	
C	Shaft End			E202 *	
R2A	750Ω	1/2			
B	100KΩ	1/2			
R3A	250KΩ	1/2		Q13-130	M-6
B	Switch			76-1	SW-
R4	1500Ω	4			10-1
R5	5000Ω	1/2		Q11-114	M-1
R6	2.5Meg.	1/2		Q11-239	M-8

* Additional parts to be used with "Concentrikit".

RE

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: IRC PART No.
R7	1000Ω	1/2		BTS-1000
R8	10KΩ 10%	1		
R9	33KΩ	1/2		
R10	18KΩ 10%	1/2		BTS-18K
R11	4700Ω 10%	1/2		BTS-4700
R12	82KΩ	1/2		
R13	1 Meg.	1/2		
R14	82KΩ	1/2		
R15	22KΩ	1/2		
R16	470Ω	1/2		
R17	6800Ω	1		
R18	100Ω 10%	1/2		
R19	100Ω 10%	1/2		
R20	22KΩ	2		BT-2-22K
R21	330Ω	1/2		BW-1/2-330
R22	8200Ω	1/2		
R23	82Ω	1/2		
R24	100Ω 10%	1/2		
R25	22KΩ	1/2		
R26	82Ω	1/2		
R27	100Ω 10%	1/2		
R28	1 Meg.	1/2		BTS-1 Meg.
R29	8200Ω	1/2		
R30	82Ω	1/2		
R31	100Ω 10%	1/2		
R32	680KΩ	1/2		BTS-680K
R33	39KΩ	1		BTA-39K
R34	1000Ω	1/2		BTS-1000
R35	8200Ω	1/2		BTS-8200
R36	120Ω 10%	1/2		
R37	22KΩ	3		
R38	27KΩ	4		
R39	22KΩ	1		BTA-22K
R40	5600Ω	1		BTA-5600
R41	2200Ω 10%	1/2		BTS-2200
R42	270KΩ	1/2		BTS-270K
R43	47KΩ	1/2		BTS-47K
R44	820KΩ 10%	1/2		BTS-820K

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.		6AG5	7BD	
V2	Mixer		6AG5	7BD	
V3	Oscillator		6C4	6BG	
V4	1st Video IF		6AU6	7BK	
V5	2nd Video IF		6AU6	7BK	
V6	3rd Video IF		6AU6	7BK	
V7	Video Det.-AGC Rectifier		6AL5	6BT	
V8	Video Amp.		6AC7	8N	
V9	DC Restorer-Sync. Sep.-Phase Inv.		12AU7	9A	
V10	Sound IF Amp.		6AU6	7BK	
V11	Ratio Det.-AF Amp.		6T8	9E	
V12	Audio Output		6V6GT	7AC	
V13	Vert. Osc.-Vert. Amp.		6SN7GT	8BD	
V14	Hor. Phase Det		6AL5	6BT	
V15	Hor. Multivibrator		6SN7GT	8BD	
V16	Hor. Output		6BG6G	5BT	
V17	Damper		6W4GT	4CG	
V18	HV Rectifier		1B3GT	3C	
V19	LV Rectifier		5U4G	5T	
V20	Picture Tube		12LP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450		AF888J	UP1JCJ1098		TVL-304	▲ Filter
B	40	450						■ Filter
C	40	450						◆ Filter
C2	500	5		PRS6/500	BRH605		TVA-27	Bias Filter
C3A	10	450		AF2222J †	UP7CJ1106		EL-410 †	▲ Decoupling
B	20	450						■ Vert. Amp. Decoupling
C	10	450						▲ Decoupling
C4	10	150		PRS150/12	BR1015		UT-121	Video Amp. Screen Bypass
C5	40	350		PRS450/40	BR4035		TVA-24	Output Plate Decoupling
C6	40	350		PRS450/40	BR4035		TVA-24	Output Cathode Bypass
C7	100	25		PRS25/100	BRH251A		TVA-8	Vert. Amp. Cathode Bypass
C8	250	25		PRS25/1006	BR2525A		TVA-9	Hor. Sweep Coupling *
C9	4	50		PRS150/4	BR550		TVA-13	Stabilizing Cap.
C10	250					GP2K-250		Ant. Coupling
C11	250					GP2K-250		Ant. Coupling
C12	25					GP1K-25		RF Coupling
C13	680					GP2K-680		AGC Filter
C14	680					GP2K-680		RF Screen Bypass
C15	680					GP2K-680		RF Filament Bypass
C16	680					GP2K-680		RF Bypass
C17	25					GP1K-25		RF Coupling
C18	.1							RF Coupling
C19	.5							RF Coupling
C20	1.5					NP0K-1.5		RF Coupling
C21	15					GP1K-15		RF Coupling
C22	5000					811-005	29C1	Mixer Screen Bypass
C23	1.5					NP0K-1.5		Osc. Coupling
C24	680							Osc. Feedback
C25	3					N150K-3		Fixed Trimmer
C26	680					GP2K-680		Osc. Filament Bypass
C27	680					GP2K-680		RF Bypass
C28	5000			1467-005	1D5D5	811-005	29C1	Mixer Plate Decoupling
C29	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C30	5000			1467-005	1D5D5	811-005	29C1	AGC Filter
C31	5000			1467-005	1D5D5	811-005	29C1	1st V. IF Decoupling
C32	5000			1467-005	1D5D5	811-005	29C1	1st V. IF Fil. Bypass
C33	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C34	.1	600		P688-1	PTE6P1		TM-1	AVC Filter
C35	5000			1467-005	1D5D5	811-005	29C1	2nd V. IF Decoupling
C36	5000			1467-005	1D5D5	811-005	29C1	2nd V. IF Fil. Bypass
C37	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C38	5000			1467-005	1D5D5	811-005	29C1	3rd V. IF Cathode Bypass
C39	5000			1467-005	1D5D5	811-005	29C1	3rd V. IF Fil. Bypass
C40	5000			1467-005	1D5D5	811-005	29C1	3rd V. IF Decoupling
C41	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C42	120	500		1468-0001	5W5T1	GP2K-120	1FM-31	IF Coupling
C43	.01	600		P688-01	PTE6S1	821-01	TM-11	AGC Filter
C44	.1	600		P688-1	PTE6P1		TM-1	Bias Filter
C45	5			1468-000005	5W5Y5	NP0K-5	MS-55	V. Diode Filter
C46	5000			1467-005	1D5D5	811-005	29C1	V. Det.-AGC Fil. Bypass
C47	680			1468-00075	1W5T7	GP2K-680	1FM-37	V. Amp. Cathode Bypass
C48	470			1468-0005	5W5T5	GP2K-470	1FM-35	V. Amp. Cathode Bypass
C49	47	300		1469-00005	5R5Q6	NP0M-50	MS-45	Fixed Trimmer
C50	47	300		1469-00005	5R5Q6	NP0M-50	MS-45	Fixed Trimmer
C51	.1	600		P688-1	PTE6P1		TM-1	Video Coupling
C52	.1	600		P688-1	PTE6P1		TM-1	Pic. Tube Cathode Dec.
C53	22	300		1468-000025	5W5Q25	GP1K-22	MS-425	Sync. Clipper Plate Bypass
C54	39	300		1468-00004	5W5Q4	GP1K-39	1FM-44	S. IF Coupling
C55	.02	600		P688-02	PTE6S2		TM-12	Decoupling
C56	5000			1467-005	1D5D5	811-005	29C1	S. IF Screen Bypass
C57	.02	600		P688-02	PTE6S2		TM-12	S. IF Decoupling
C58	3					NP0K-3		Fixed Trimmer
C59	1000			1468-001	1W5D1	GP2L-001	1FM-21	Diode Load Cap.
C60	3900			1467-004	1D5D4		1FM-24	De-emphasis
C61	.05	600		P688-05	PTE6S5		TM-15	Audio Coupling
C62	.005	600		P688-005	PTE6D5	811-005	TM-25	Audio Coupling

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C63	.02	600		P688-02	PTE6S2		TM-12	Audio Coupling
C64	.05	600		P688-05	PTE6S5		TM-15	Bias Filter
C65	.01	600		P688-01	PTE6S1	821-005	TM-11	Output Plate Bypass
C66	.01	600		P688-01	PTE6S1	821-005	TM-11	Sync. Coupling
C67	2000			1467-003	1W5D2	GP2M-002	1FM-22	Integrator Net.
C68	5000			1467-005	1D5D5	811-005	1FM-25	Integrator Net.
C69	5000			1467-005	1D5D5	811-005	1FM-25	Integrator Net.
C70	4700			1467-005	1D5D5	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C71	.1	600		P688-1	PTE6P1		TM-1	Vert. Discharge
C72	.25	600		684-25	GT6P25		TC-2	Vert. Sweep Coupling
C73	1000			1468-001	1W5D1	GP2L-001	1FM-21	Hor. Sync. Coupling
C74	1000			1468-001	1W5D1	GP2L-001	1FM-21	Hor. Sync. Coupling
C75	.005	600		P688-005	PTE6D5	811-005	TM-25	AFC Filter
C76	.05	600		P688-05	PTE6S5		TM-15	AFC Filter
C77	.05	600		P688-05	PTE6S5		TM-15	Hor. Feedback
C78	.01	600		P688-01	PTE6S1	821-01	TM-11	AFC Filter
C79	270	500		1468-0003	5W5T3	GP2K-270	MS-33	Hor. MV Feedback †
C80	3900	500						Fixed Trimmer
C81	390	500		1468-0004	5W5T4	GP2K-390	1FM-34	Hor. Discharge
C82	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	Hor. Sweep Coupling
C83	13	1500						Hor. Feedback
C84	.05	600		P688-05	PTE6S5		TM-15	Hor. Output Screen Bypass
C85	.25	600		684-25	GT6P25		TC-2	Hor. Output Cath. Bypass
C86	.035	600		P688-033				Damper Filter
C87	.25	600		684-25	GT6P25		TC-2	Damper Filter
C88	.25	600		684-25	GT6P25		TC-2	Hor. Sweep Coupling
C89	500	10000						HV Filter
C90	5000			1467-005	1D5D5	811-005	29C1	Filament Bypass
C91	.01	600		P688-01	PTE6S1	821-01	TM-11	Line Filter
C92	.01	600		P688-01	PTE6S1	821-01	TM-11	Line Filter

* Not used in all models.
† Some models use 330MMF in this application.
‡ Parallel sections to obtain desired capacity.
$ Use two in parallel.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½		B11-137 *		Vert. hold control, front
B	50KΩ	½		B11-123 *		Horiz. hold control, rear
C	Shaft End			E202 *		Attach per instructions in "Concentrikit".
R2A	750Ω	½				Contrast control, tapped at 500KΩ
B	100KΩ	½				Brightness control
R3A	250KΩ	½		Q13-130	M-64-Z	Volume control
B	Switch			76-1	SW-A	Attach to R3A per instructions
R4	1500Ω	4			10-1500	Focus control-Wire Wound
R5	5000Ω	½		Q11-114	M-19-S	Vert. linearity control
R6	2.5Meg.	½		Q11-239	M-84-S	Height control

* Additional parts to be used with "Concentrikit".

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES: ALL RESISTORS ARE ± 20% UNLESS OTHERWISE STATED.
R7	1000Ω	½		BTS-1000	RF Grid
R8	10KΩ 10%	1			RF Plate
R9	33KΩ	½			RF Screen
R10	18KΩ 10%	½		BTS-18K	RF Plate Coil Shunt
R11	4700Ω 10%	½		BTS-4700	Mixer Coil Shunt
R12	82KΩ	½			Mixer Grid
R13	1 Meg.	½			Mixer Grid
R14	82KΩ	½			Mixer Screen
R15	22KΩ	½			Osc. Grid
R16	470Ω	½			Osc. Cathode
R17	6800Ω	1			Osc. Plate
R18	100Ω 10%	½			Mixer Plate Decoupling
R19	100Ω 10%	½			Decoupling
R20	22KΩ	2		BT-2-22K	Voltage Dropping
R21	330Ω			BW-½-330	AGC Network
R22	8200Ω	½			1st Video IF Grid
R23	82Ω	½			1st Video IF Cathode
R24	100Ω 10%	½			1st Video IF Decoupling
R25	22KΩ	½			2nd Video IF Grid
R26	82Ω	½			2nd Video IF Cathode
R27	100Ω 10%	½			2nd Video IF Decoupling
R28	1 Meg.	½		BTS-1 Meg.	AGC Network
R29	8200Ω	½			3rd Video IF Grid Coil Shunt
R30	82Ω	½			3rd Video IF Cathode
R31	100Ω 10%	½			3rd Video IF Decoupling
R32	680KΩ	½		BTS-680K	AGC Rect. Diode Load
R33	39KΩ	1		BTA-39K	Voltage Divider
R34	1000Ω	½		BTS-1000	Bias Network
R35	8200Ω	½		BTS-8200	Video Det. Diode Load
R36	120Ω 10%	½			Parasitic Supp.
R37	22KΩ	3			Video Amp. Screen See Note 1
R38	27KΩ	4			Video Amp. Plate See Note 1
R39	22KΩ	1		BTA-22K	Voltage Divider
R40	5600Ω	1		BTA-5600	Voltage Divider
R41	2200Ω 10%	½		BTS-2200	Picture Tube Grid
R42	270KΩ	½		BTS-270K	DC Rest. Load
R43	47KΩ	½		BTS-47K	DC Rest. Load
R44	820KΩ 10%	½		BTS-820K	Voltage Divider

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R45	1 Meg.	½		BTS-1 Meg.	Sync. Phase Inv. Grid
R46	3900Ω	½		BTS-3900	Sync. Phase Inv. Cathode
R47	3900Ω	½		BTS-3900	Sync. Phase Inv. Plate
R48	3900Ω	½		BTS-3900	Sync. Phase Inv. Plate
R49	22KΩ	½		BTS-22K	Integrator
R50	1000Ω	½		BTS-1000	Acc. Anode Decoupling
R51	220KΩ	½		BTS-220K	Voltage Divider
R52	10KΩ 10%	½		BTS-10K	Voltage Divider
R53	470KΩ	½			Sound IF Grid
R54	1000Ω	½		BTS-1000	Sound IF Cathode
R55	39KΩ	1			Sound IF Screen
R56	12KΩ	½		BTS-12K	Voltage Divider
R57	1000Ω	½		BTS-1000	Sound IF Decoupling
R58	15KΩ	½		BTS-15K	De-emphasis
R59	6800Ω	½		BTS-6800	Ratio Det. Diode Load
R60	6800Ω	½		BTS-6800	Ratio Det. Diode Load
R61	470KΩ	½		BTS-470K	RF Grid
R62	330KΩ 5%	½		BTS-330K-5%	AF Plate
R63	100KΩ	½		BTS-100K	Output Grid
R64	330KΩ 10%	½		BTS-330K	Voltage Divider
R65	180KΩ 5%	½		BTS-180K-5%	Voltage Divider
R66	4700Ω	½		BTS-4700	Voltage Divider
R67	470KΩ	½		BTS-470K	Voltage Divider
R68	390Ω	1		BW-1-390	Filter
R69	8200Ω	½		BTS-8200	Integrator
R70	8200Ω	½		BTS-8200	Integrator
R71	1 Meg.	½		BTS-1 Meg.	Vert. Osc. Grid See Note 2
R72	1 Meg.	½		BTS-1 Meg.	Vert. Osc. Plate See Note 3
R73	6.8 Meg.	½		BTS-6.8 Meg.	Voltage Divider
R74	100KΩ	½		BTS-100K	Voltage Divider
R75	560Ω	½		BTS-560	Vert. Amp. Cathode
R76	2.2 Meg.	½		BTS-2.2 Meg.	Vert. Amp. Grid
R77	3300Ω	½		BTS-3300	Vert. Peaking
R78	3900Ω	½		BTS-3900	Vert. Amp. Plate Decoupling
R79	100KΩ	½		BTS-100K	Horiz. Phase Det. Load
R80	100KΩ	½		BTS-100K	Horiz. Phase Det. Load
R81	4.7 Meg.	½		BTS-4.7 Meg.	Horiz. Phase Det. Load
R82	470KΩ	½		BTS-470K	Horiz. AFC Filter Network
R83	27KΩ	½		BTS-27K	Feedback Network
R84	4700Ω	½		BTS-4700	Feedback Network
R85	5600Ω	½		BTS-5600	Horiz. MV Plate
R86	1500Ω	½		BTS-1500	Horiz. MV Cathode
R87	100KΩ	½		BTS-100K	Horiz. MV Grid
R88	270KΩ	½		BTS-270K	Horiz. MV Plate
R89	22KΩ	½		BTS-22K	Filter
R90	56KΩ	½		BTS-56K	Filter
R91	68Ω	½			Parasitic Supp.
R92	1 Meg.	½		BTS-1 Meg.	Horiz. Output Grid
R93	82Ω	1		BW-1-82	Horiz. Output Cathode
R94	8200Ω	2		BT-2-8200	Horiz. Output Screen
R95	6000Ω	20		DG-6000	Damper Filter-Wire Wound
R96	3.3Ω	½			HV Rect. Filament
R97	1 Meg.	1			HV Filter
R98	15Ω	½		BW-½-15	Bias Network
R99	20KΩ	20		DG-20K	Bleeder-Wire Wound-See Note 4
R100	1000Ω	2		BT-2-100	Focus Coil Shunt
R101	400Ω	3		AB-400	Focus Coil Shunt-See Note 4

Note 1. Some models use two resistors in parallel to obtain required resistance and wattage.
Note 2. Some models use 680KΩ resistor in this application.
Note 3. Some models use 1.5 Meg. resistor in this application.
Note 4. Not used in all models.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.
T1	117VAC at 1.92A	830VCT .310ADC	5VAC at 3A	6.3VAC at 6A SEC. 4 6.3VAC at 2.7A				TP-392

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: STARRETT PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	NOTES
T2	120Ω						Hor. Osc. Control Coil
T3	230Ω	800Ω		A-8121	A-4000	TBO-1	Vert. Block Osc. Trans.
T4	385Ω Tap. at 125Ω	SEC. 1 13.60 Tap at .60 SEC. 2 0Ω 7Ω		A-8118		TFB-1	Hor. Output Trans.
T5	560Ω			A-8116	A-3035	TSO-4	Vert. Output Trans.
T6A	13.5Ω			DY-1	MD-1		Hor. Deflection Coil
B	60Ω						Vert. Deflection Coil
T7	250Ω			FC-10	MF-1		Focus Coil

STARRETT MODEL "NATHAN HALE"

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		STARRETT PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T8	4.5KΩ	3.6Ω	365Ω	.5Ω		A-3877	A-2930	RO-9	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	STARRETT PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	3.6Ω			46A1①	①Remount output transformer
	CONE DIA.	V. C. DIA.				
SP2	3 7/8 x 5 7/8"	9/16"				

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ↶)	STARRETT PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.210A	32Ω	1.5 Henries		C-2325 ②	C-2974	TR-4200②	②Drill one new mounting hole.

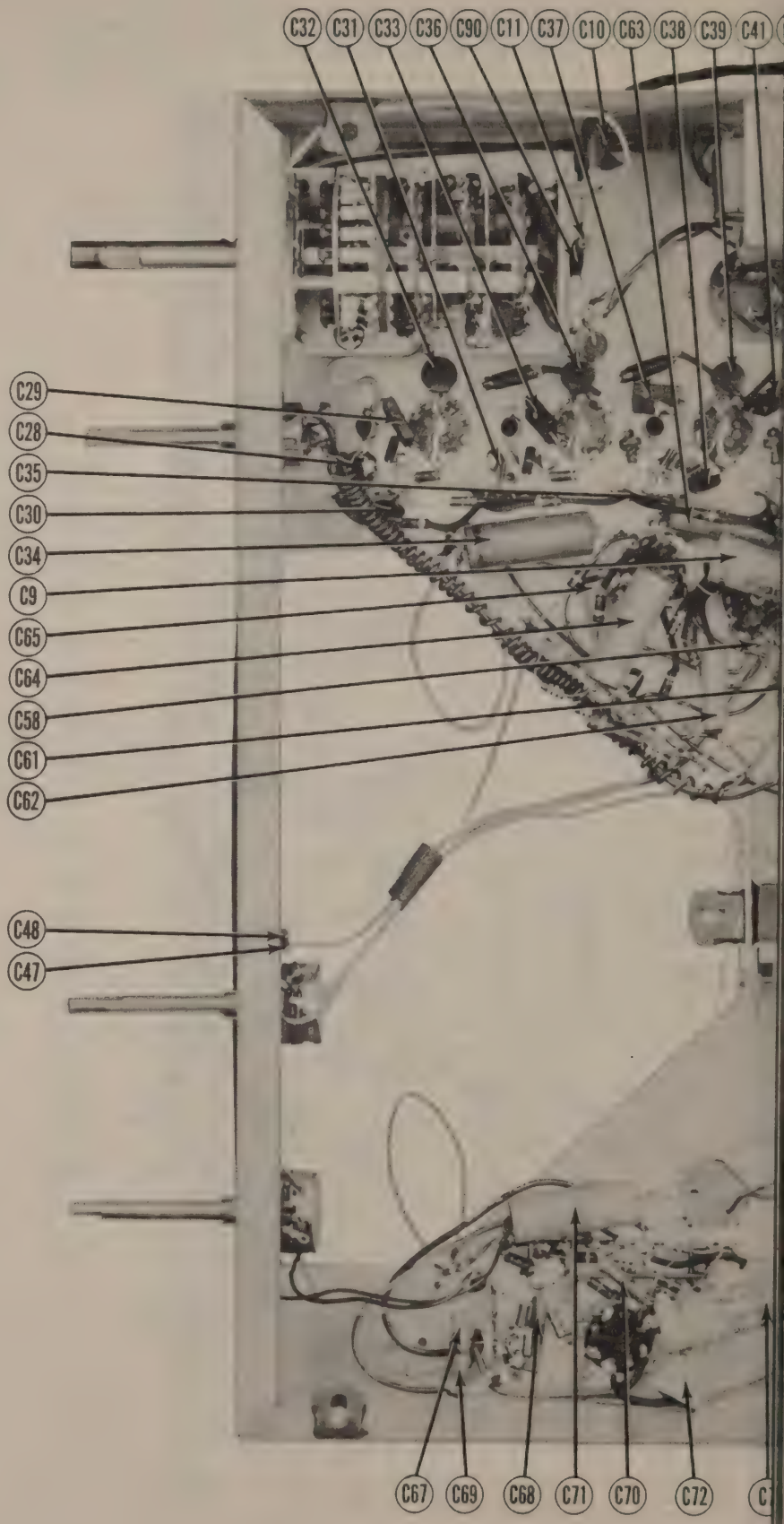
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	STARRETT PART No.	MEISSNER PART No.	
L2	Ant. Input Trans.	.2Ω .2Ω CT				
L3	Fil. Choke	0Ω				
L4	Fil. Choke	0Ω				
L5	1st Video IF	.2Ω				
L6	Fil. Choke	.2Ω				
L7	2nd Video IF	.2Ω				
L8	Fil. Choke	.2Ω				
L9	2nd Video IF Plate Choke	4.5Ω				
L10	3rd Video IF	.2Ω				
L11	Fil. Choke	.2Ω				
L12	3rd Video IF Plate Choke	4.5Ω				
L13	4th Video IF	.2Ω				
L14	Peaking	9Ω				Inductance-120 microhenries
L15	Peaking	22Ω				Inductance-600 microhenries
L16	Peaking	9Ω				Wound on 18KΩ resistor
L17	Peaking	14Ω				
L18	Sound IF	2Ω	2Ω			
L19	Ratio Det. Trans.	4Ω	.3Ω			
L20	Width Cont.	.2Ω				
L21	Hor. Linearity	19Ω				

MISCELLANEOUS

ITEM No.	PART NAME	STARRETT PART No.	NOTES
M1	RF Tuner		
M2	Ion Trap		
M3	Fuse		.25A, 250V
M4	Fuse		5A, 250V

SISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-C

PHOTOFACT* Folder

TELE-TONE MODEL

TV-285

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TELE-TONE MODEL

TV-285

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Date 3/50 Set No. 87—Folder No. 13

TELE-TONE
MODEL TV-285

TELE-TONE
MODEL TV-285

TRADE NAME	Tele-Tone Model TV-285
MANUFACTURER	Tele-Tone Radio Co., 540 W. 58th St., New York 19, New York
TYPE SET	Television Receiver
TUBES	Twenty Four
POWER SUPPLY	110-120 Volts AC-60 Cycle
RATING	1.67 Amp. at 117 Volts AC
TUNING RANGE—	Channels 2 thru 13

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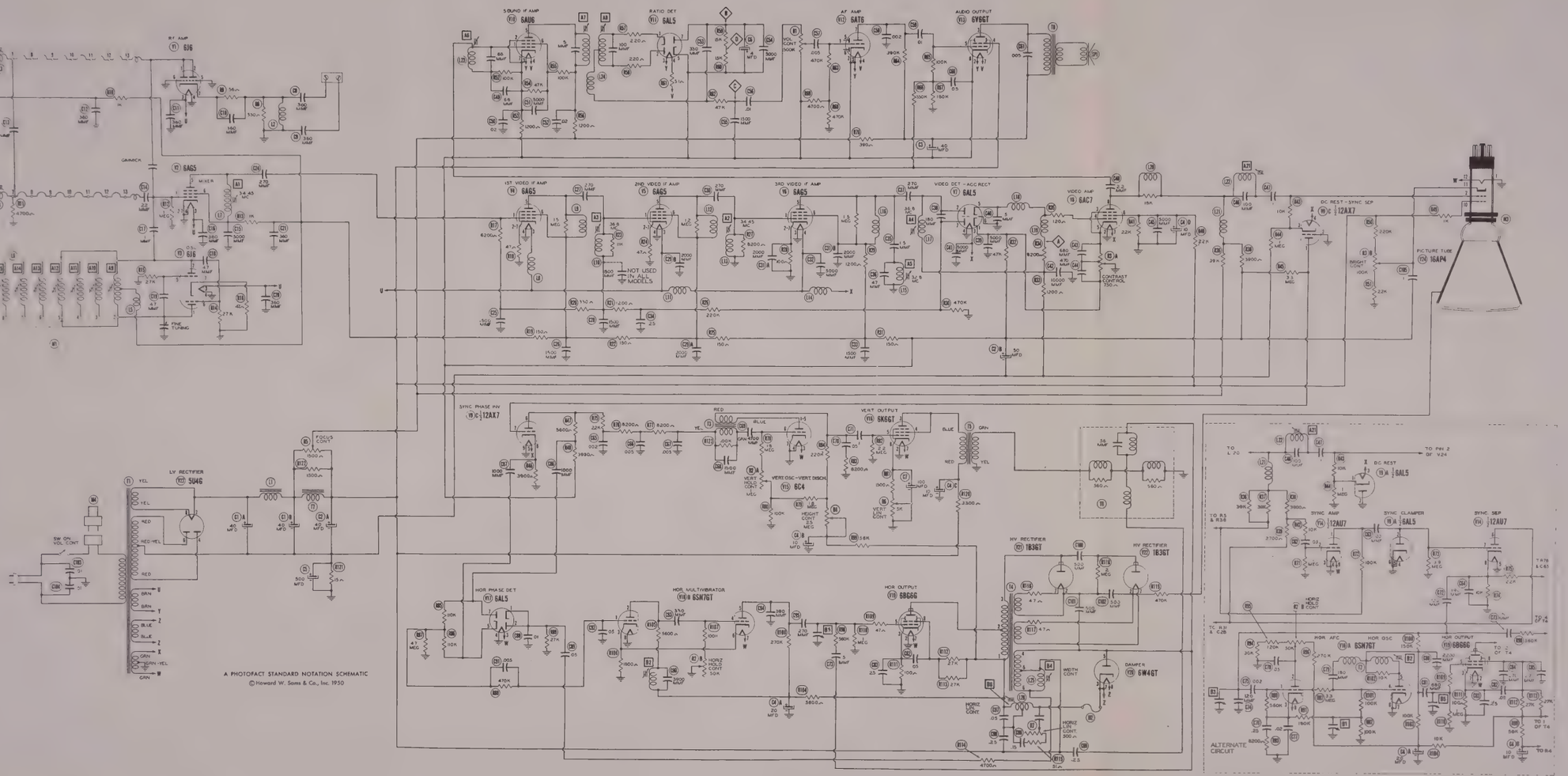
SOUND IF AMP
V10 6AU6
RATIO DET
V11 6AL5
AF AMP
V12 6AT6
AUDIO OUTPUT
V13 6V6GT
RF AMP
V1 6J6
MIXER
V2 6AG5
V3 6J6
1ST VIDEO IF AMP
V4 6AG5
2ND VIDEO IF AMP
V5 6AG5
3RD VIDEO IF AMP
V6 6AG5
VIDEO DET - AGC RECT
V7 6AL5
VIDEO AMP
V8 6AC7
CONTRAST CONTROL
DC REST - SYNC SEP
V9 1/2 12AX7
PICTURE TUBE
V14 16AP4
BRIGHT CONT
SYNC PHASE INV
V9 1/2 12AX7
VERT OSC - VERT DISCH
V15 6C4
VERT OUTPUT
V16 6K6GT
HEIGHT CONT
VERT LIN CONT
HOR PHASE DET
V17 6AL5
HOR MULTIVIBRATOR
V18 A 6SN7GT
HORIZ HOLD CONT
HOR OUTPUT
V18 B 6BG6G
HORIZ LIN CONT
HORIZ LIN COIL
WIDTH CONT
HV RECTIFIER
V22 1B3GT
HV RECTIFIER
V22 1B3GT
DAMPER
V19 6W4GT
LV RECTIFIER
V21 5U4G
FOCUS CONT
SW ON VOL CONT
DC REST
V9 A 6AL5
SYNC AMP
V14 12AU7
SYNC CLAMPER
V9 A 6AL5
SYNC SEP
V14 12AU7
HOR AFC
HOR OSC
V18 A 6SN7GT
HOR OUTPUT
V19 6BG6G
ALTERNATE CIRCUIT
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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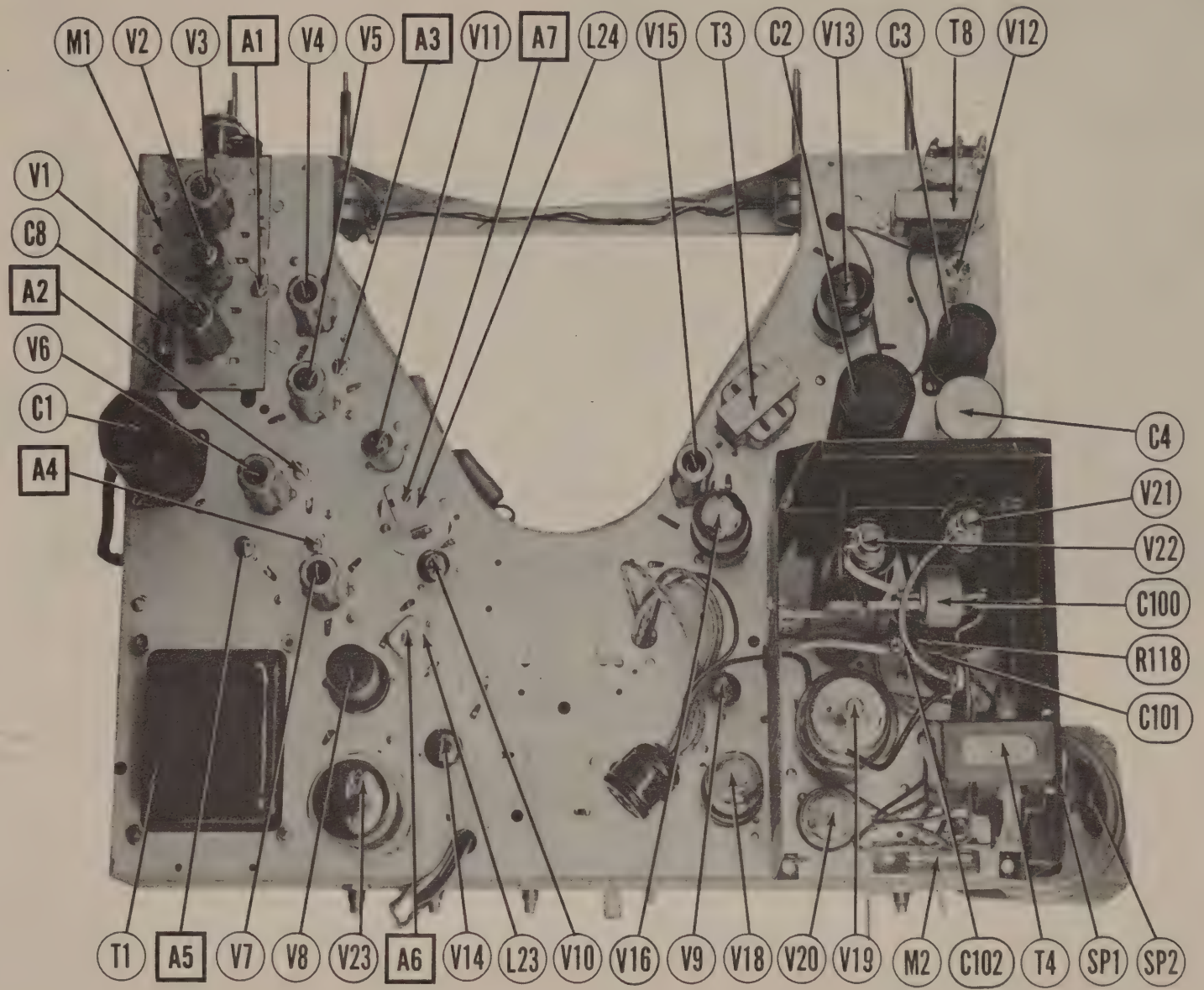
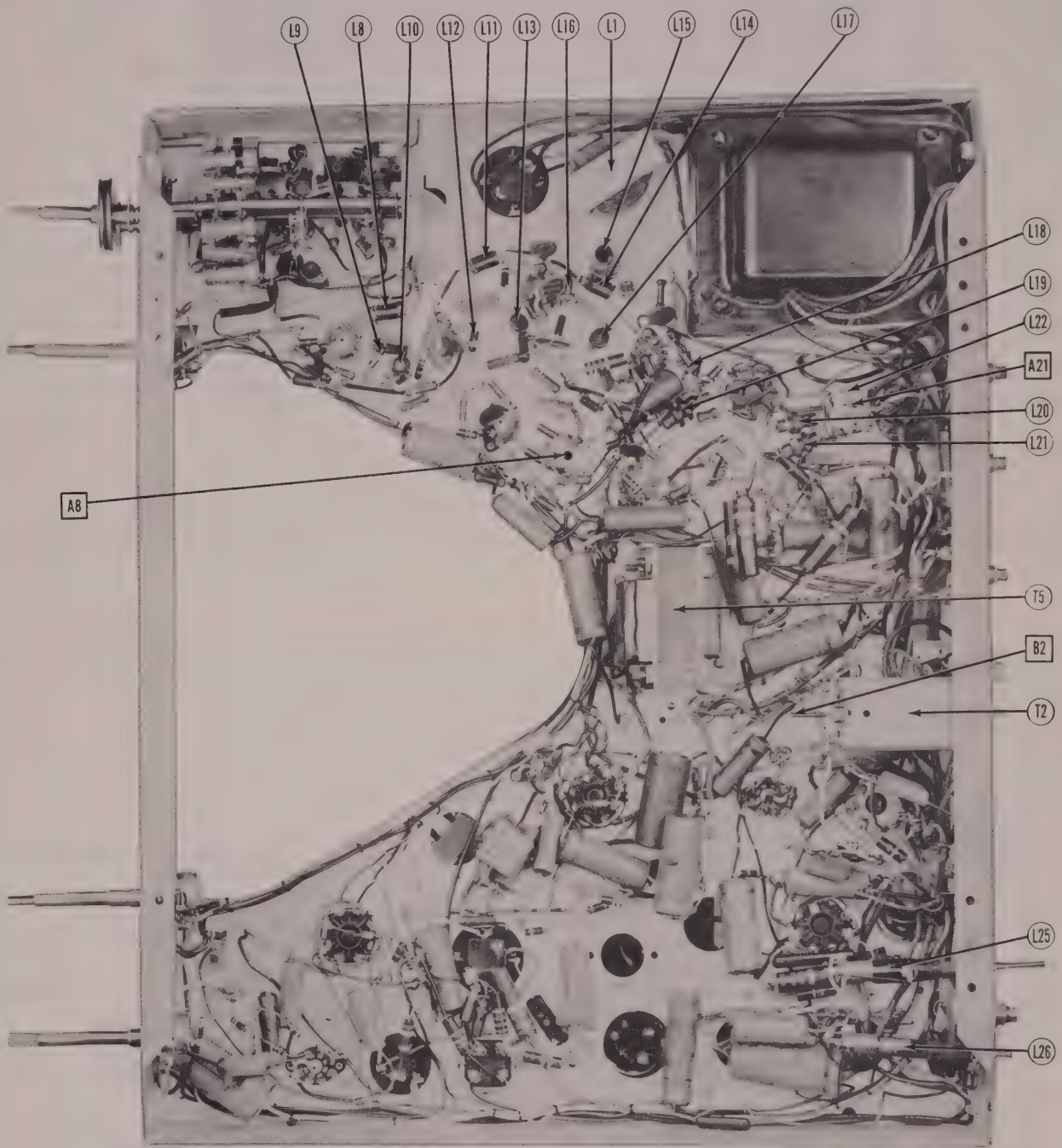
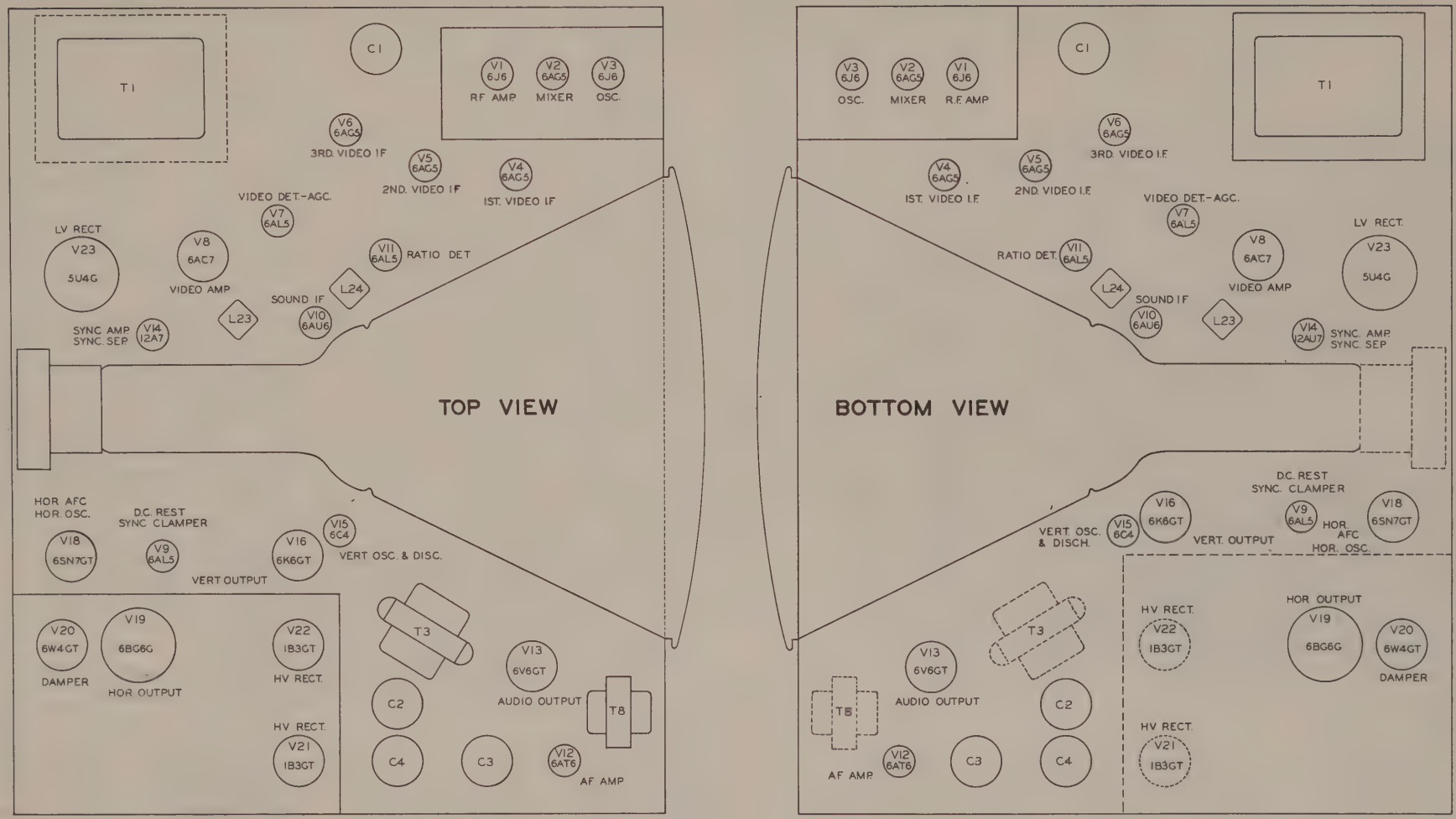


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To eliminate the high voltage shock hazard, remove the horizontal oscillator tube (V18) from its socket.

VIDEO IF ALIGNMENT

Remove the local oscillator tube (V3) to prevent erroneous indications.
Note that the VTVM common lead is connected to -3 1/2 volts.
Do not allow the VTVM case to become grounded.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	34.45MC (Unmod.)	Any	DC Probe and common leads across R34.	A1, A2	Adjust for maximum deflection.
2.	Direct	"	36.8MC	"	"	A3, A4	Adjust for maximum deflection.
3.	Direct	"	32.8MC	"	"	A5	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	34.8MC (10MC Sweep)	32.8MC 37.3MC	Any	Vert. Amp. to Point (A) Low side to chassis.		Check for response curve similar to Fig 1. If necessary retouch A1 thru A5 for proper response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to pin 4 (Grid) of 6AC7 (V8). Low side to chassis.	4.5MC (Unmod.)	Any channel not used locally	DC Probe to Point (B) Common to chassis.	A6, A7	Adjust for maximum deflection.
6.	.01MFD	"	"	"	DC Probe to Point (C) Common to Point (D)	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ~ modulation and 450KC sweep. Use 120 ~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to pin 4 (Grid) of 6AC7 (V8). Low side to chassis.	4.5MC (450KC Sweep)	4.5MC	Any channel not used locally	Vert. Amp. to Point (B) Low side to chassis.	A6, A7	Disconnect stabilizer capacitor C6. Adjust for maximum amplitude and symmetry as per Fig 2.
6.	.01MFD	"	"	"	"	Vert. Amp. to Point (C) Low side to chassis.	A8	Reconnect capacitor C6. Adjust A8 so 4.5MC marker occurs at center of crossover lines as per Fig. 3. SLIGHTLY retouch A7 for max. amplitude and straightness of crossover lines.

OSCILLATOR ALIGNMENT

Replace the local oscillator tube (V2).
Set the fine tuning control to the mid-position of its range.
The RF and mixer portions of this receiver are pre-set at the factory and should not require adjustment in the field.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to ungrounded antenna terminal. Low side to chassis.	57MC (10MC Sweep)	55.25MC 59.75MC	2	Vert. Amp. to Point (A) Low side to chassis.	A9	Adjust to place sound marker as shown in Fig 4. The video marker should be at 50%.
			63MC (10MC SWP)	61.25MC 65.75MC	3		A10	
			69MC (10MC SWP)	67.25MC 71.75MC	4		A11	
			79MC (10MC SWP)	77.25MC 81.75MC	5		A12	
			85MC (10MC SWP)	83.25MC 87.75MC	6		A13	
			177MC (10MC SWP)	175.25MC 179.75MC	7		A14	
			183MC (10MC SWP)	181.25MC 185.75MC	8		A15	
			189MC (10MC SWP)	187.25MC 191.75MC	9		A16	
			195MC (10MC SWP)	193.25MC 197.75MC	10		A17	
			201MC (10MC SWP)	199.25MC 203.75MC	11		A18	
			207MC (10MC SWP)	205.25MC 209.75MC	12		A19	
			213MC (10MC SWP)	211.25MC 215.75MC	13		A20	

4.5MC TRAP ADJUSTMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.01MFD	High side to pin 4 (Grid) of 6AC7 (V8). Low side to chassis.	4.5MC (400 ~ Mod.)	Not used.	Any	Vert. Amp. to pin 2 (Grid) of picture tube (V24). Low side to chassis.	A21	Adjust for minimum 400 ~ indication on scope.

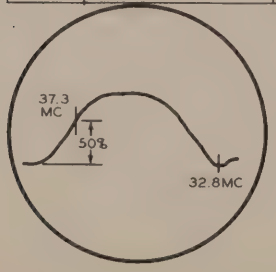


FIG. 1

FIG. 2

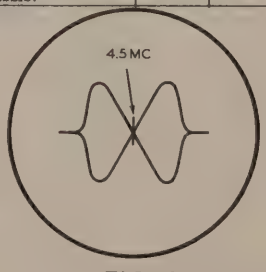


FIG. 3

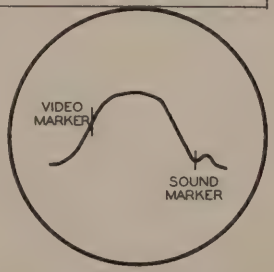
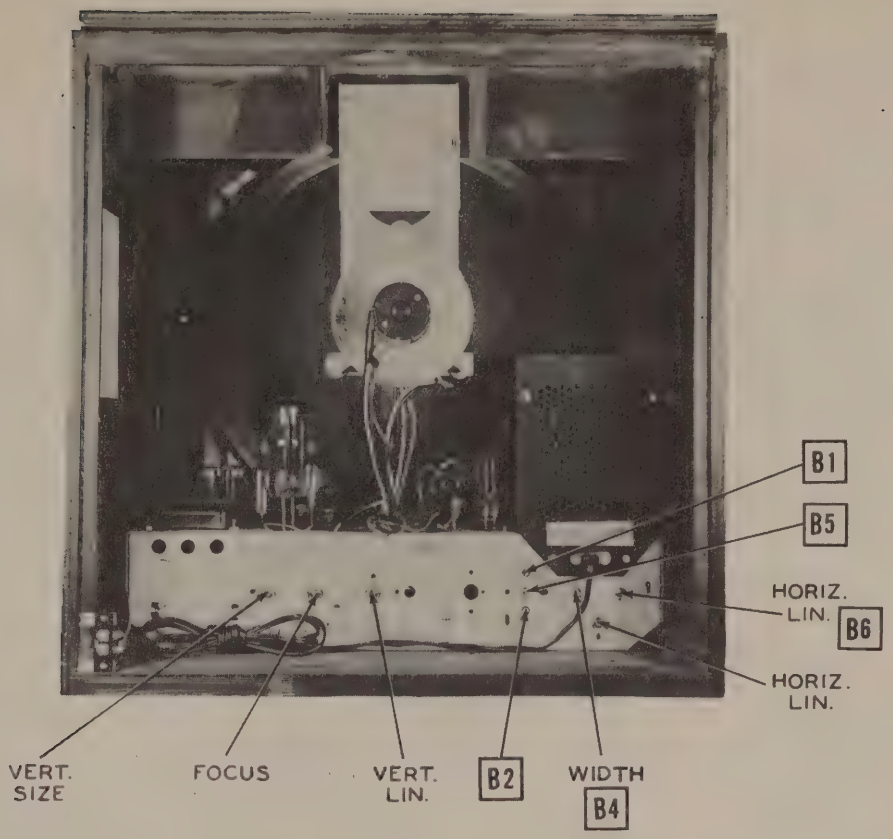


FIG. 4



CABINET–REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

HORIZONTAL OSCILLATOR ALIGNMENT CHECK:

Tune in test pattern and turn horizontal hold control to extreme counter-clockwise position. Picture should remain in synchronization. Turn channel switch to another channel and then back to the original channel. Normally, the picture should be out of synchronization. Turn the control clockwise and the picture should slowly begin to synchronize and finally lock-in. This should occur when the control is approximately 90° from the extreme counter-clockwise position. The picture should remain in synchronization for another 90° in the clockwise direction of the control. At the extreme clockwise position the picture should again drop out of synchronization and $3\frac{1}{2}$ to $4\frac{1}{2}$ bars should be seen sloping downward to the right. If the receiver fails to hold synchronization during this check with the hold control at the extreme counter-clockwise position or fails to hold synchronization for at least 60° in the clockwise direction from the point when it drops into "sync" it will be necessary to align the horizontal oscillator circuit as follows:

(A) HORIZONTAL OSCILLATOR ALIGNMENT:

Turn horizontal hold control to extreme clockwise position. Tune in test pattern and adjust trimmer B1 until picture is out of sync. and shown $3\frac{1}{2}$ to $4\frac{1}{2}$ bars sloping downward to the right. If the trimmer has insufficient range, set it to its mid-position (one turn from tight) and adjust slug B2 until bars appear.

(B) HORIZONTAL LOCKING ALIGNMENT:

Turn the horizontal hold control to full counter-clockwise position. Switch to another channel and back to the original again.

Slowly turn horizontal hold control clockwise and note the least number of diagonal bars present just before picture syncs. If more than $4\frac{1}{2}$ bars are present just before picture syncs adjust "horizontal lock" trimmer B3 slightly clockwise. If less than $3\frac{1}{2}$ bars are present adjust B3 slightly counter-clockwise and switch channel selector to another channel and back again. Recount bars present at the "lock-in" point. Repeat this procedure until $3\frac{1}{2}$ to $4\frac{1}{2}$ bars are present.

Repeat steps (A) and (B) until conditions exist as outlined under "Horizontal Oscillator Alignment Check".

WIDTH, DRIVE AND HORIZONTAL LINEARITY ADJUSTMENT:

Turn width control B4 to maximum clockwise position. Adjust "horizontally drive" trimmer B5 for maximum brightness and linearity. Adjust horizontal linearity B6 for best linearity in the right half of the picture. Readjust width control until picture fills the mask.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS:

Adjust the height control until picture fills mask vertically. Adjust the vertical linearity control until the test pattern is symmetrical from top to bottom.

Due to intraction between these two controls it is necessary to repeat the adjustments. Adjust the vertical centering control to align the picture with the mask.

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	150VDC	150VDC	6.3VAC	0V.	0V.	0V.	0V.		
V 2	6AG5	-.8VDC	0V.	6.3VAC	0V.	105VDC	105VDC	0V.		
V 3	6J6	100VDC	100VDC	6.3VAC	0V.	§-1.7VDC	§-1.5VDC	.4VDC		
V 4	6AG5	-2VDC	.3VDC	6.3VAC	0V.	110VDC	110VDC	.3VDC		
V 5	6AG5	-.4VDC	.3VDC	6.3VAC	0V.	115VDC	115VDC	.3VDC		
V 6	6AG5	0V.	1VDC	0V.	6.3VAC	110VDC	110VDC	1VDC		
V 7	6AL5	.1VDC	-1.9VDC	6.3VAC	0V.	-.9VDC	0V.	-1.5VDC		
V 8	6AC7	0V.	0V.	2.1VDC	-1.3VDC	2.1VDC	160VDC	6.3VAC	170VDC	
V 9	6AL5	.6VDC	-2.1VDC	6.3VAC	0V.	0V.	0V.	0V.		
V 10	6AU6	†2.3VDC	†4.3VDC	†0V.	†6.3VAC	†210VDC	†55VDC	†4.3VDC		
V 11	6AL5	†-.5VDC	†-.1VDC	†0V	†5.4VAC	†0V.	0V.	†-.9VDC		
V 12	6AT6	†-.6VDC	†0V.	†0V.	†6.3VAC	0V.	0V.	†115VDC		
V 13	6V6GT	0V.	†0V.	†185VDC	†200VDC	†-7.5VDC	117VDC	†6.3VAC	†0V.	
V 14	12AU7	42VDC	-.3VDC	0V.	0V.	0V.	130VDC	-2VDC	3.1VDC	6.3VAC
V 15	6C4	85VDC 330VDC	0V.	6.3VAC	0V.	85VDC 330VDC	-5.5VDC	0V.		
V 16	6K6GT	0V.	0V.	290VDC	290VDC	0V.	0V. 27VDC	6.3VAC	22VDC 3#VDC	
V 17	6AL5	♦	♦	♦	♦	♦	♦	♦		
V 18	12SN7GT	-2VDC	120VDC	1.4VDC	-55VDC	180VDC	0V.	0V.	6.3VAC	
V 19	6BG6G	0V.	6.3VAC	5.2VDC	0V	-16VDC	0V.	0V.	250VDC	TOP CAP *
V 20	6W4GT	0V.	0V.	490VDC	0V.	340VDC	0V.	490VDC	490VDC	
V 21	1B3GT	* DO NOT MEASURE.								
V 22	1B3GT	* DO NOT MEASURE.								
V 23	5U4G	0V.	430VDC	0V.	390VAC	0V.	390VAC	0V.	430VDC	
V 24	16AP4	0V.	.6VDC	PIN 10 340VDC	PIN 11 115VDC	PIN 12 6.3VAC				

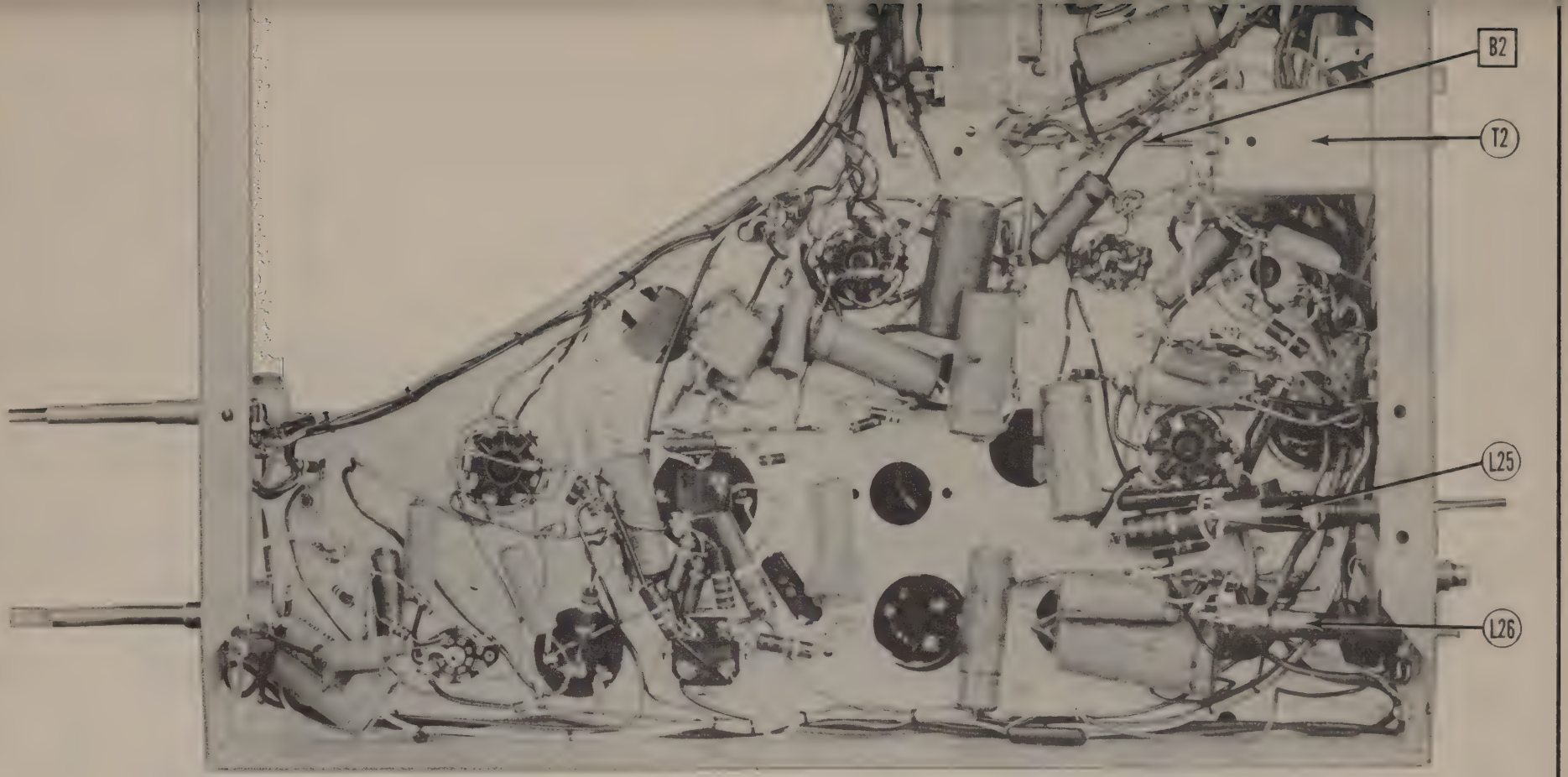
§ TAKEN WITH VACUUM TUBE VOLTMETER.
† MEASURED FROM PIN 8 OF V13.
* DO NOT MEASURE.
♦ NOT USED IN ALL MODELS.

RESISTANCE READINGS

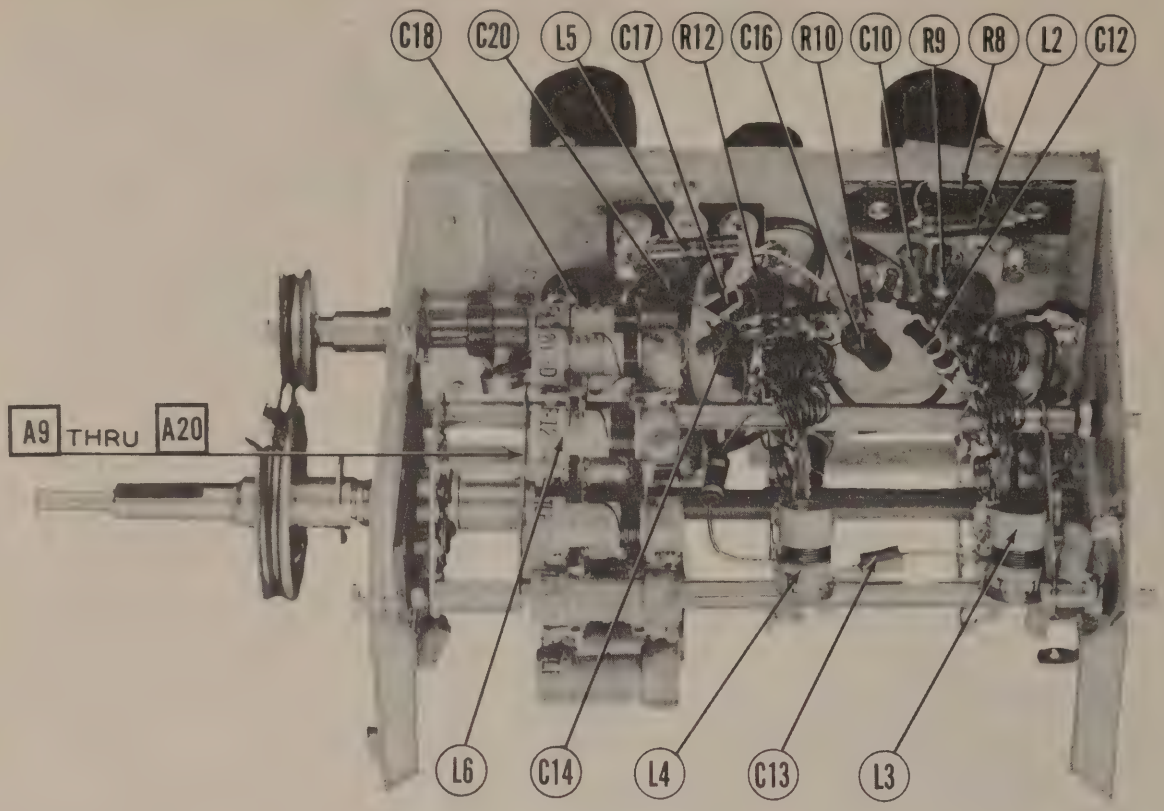
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	†1.5KΩ	†1.5KΩ	.1Ω	0Ω	0Ω	0Ω	56Ω		
V 2	6AG5	1 Meg.	0Ω	.1Ω	0Ω	†1.5KΩ	†1.5KΩ	0Ω		
V 3	6J6	†600Ω	†600Ω	.1Ω	0Ω	27KΩ	27KΩ	47Ω		
V 4	6AG5	700KΩ	47Ω	.1Ω	0Ω	†450Ω	†450Ω	47Ω		
V 5	6AG5	700KΩ	47Ω	.1Ω	0Ω	†300Ω	†300Ω	47Ω		
V 6	6AG5	.2Ω	190Ω	0Ω	.1Ω	†1.3KΩ	†1.3KΩ	100Ω		
V 7	6AL5	22Ω	1000Ω	.1Ω	0Ω	10KΩ	0Ω	470KΩ		
V 8	6AC7	0Ω	0Ω	750Ω	10KΩ	750Ω	#12KΩ	.1Ω	†5.6KΩ	
V 9	6AL5	1 Meg.	3.9 Meg.	.1Ω	0Ω	0Ω	0Ω	0Ω		
V 10	6AU6	†100KΩ	†1000Ω	†.1Ω	†0Ω	#2KΩ	†40KΩ	†1000Ω		
V 11	6AL5	†Inf.	†Inf.	†0Ω	†2Ω	†0Ω	Inf.	†30KΩ		
V 12	6AT6	†500KΩ	†0Ω	†0Ω	†.1Ω	Inf.	Inf.	#390KΩ		
V 13	6V6GT	Inf.	†0Ω	#1.3KΩ	#750Ω	250KΩ	80KΩ	†.1Ω	†0Ω	
V 14	12AU7	#100KΩ	1 Meg.	0Ω	0Ω	0Ω	†0Ω	3.9 Meg.	10KΩ	.1Ω
V 15	6C4	¶2.8Meg. ¶270KΩ	19Ω	.1Ω	0Ω	¶2.8Meg. ¶270KΩ	1.8Meg.	0Ω		
V 16	6K6GT	0Ω	0Ω	#3.4KΩ	#3.4KΩ	.2.2Meg.	6.5KΩ 0Ω	.1Ω	6.5KΩ 1.5KΩ	
V 17	6AL5	♦	♦	♦	♦	♦	♦	♦		
V 18	12SN7GT	800KΩ	¶280KΩ	280KΩ	200KΩ	¶110KΩ	0Ω	0Ω	.1Ω	
V 19	6BG6G	Inf.	.1Ω	100Ω	Inf.	1 Meg.	Inf.	0Ω	¶13KΩ	TOP CAP ¶110Ω
V 20	6W4GT	Inf.	Inf.	280KΩ	Inf.	#750Ω	Inf.	280KΩ	280KΩ	
V 21	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ¶230Ω
V 22	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP Inf.
V 23	5U4G	Inf.	25KΩ	Inf.	40Ω	Inf.	40Ω	Inf.	25KΩ	
V 24	16AP4	0Ω	1 Meg.	PIN 10 #1.5KΩ	PIN 11 90KΩ	PIN 12 .1Ω				

† MEASURED FROM PIN 8 OF V13.
# MEASURED FROM PIN 2 OF V23.
¶ MEASURED FROM PIN 3 OF V20.
♦ NOT USED IN ALL MODELS.

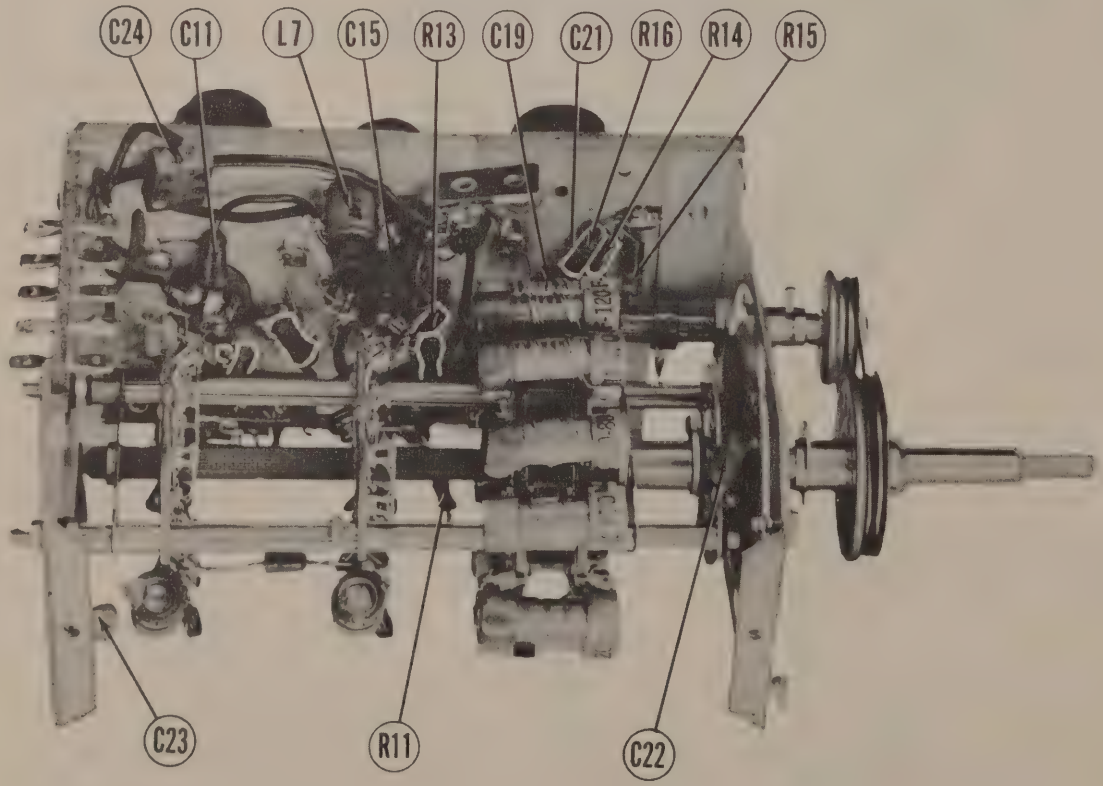
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



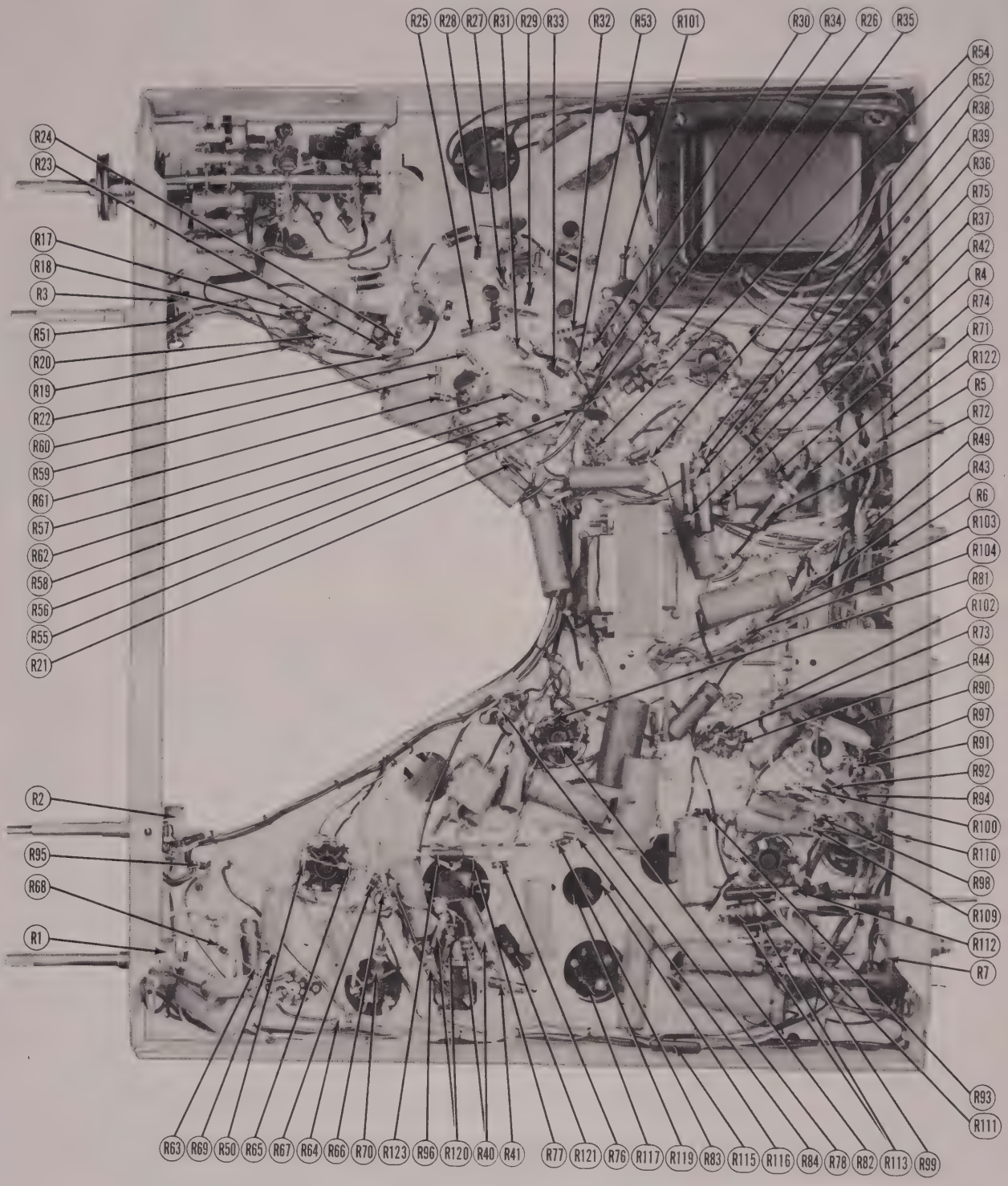
RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

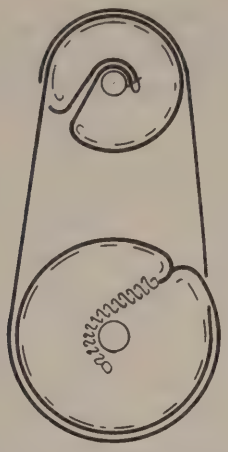
CHASSIS BOTTOM VIEW–CAPACITOR IDENTIFICATION

TELE-TONE
MODEL TV-285



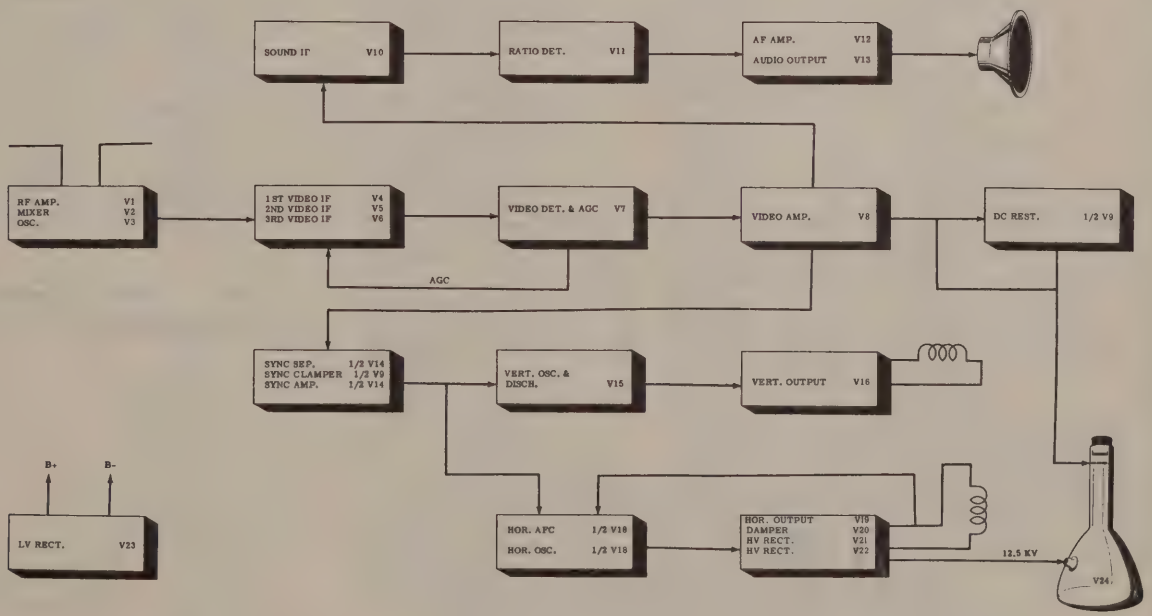
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

FINE TUNING CORD STRINGING



DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs.
2. Remove seven screws holding rear cover. Remove cover.
3. Loosen two screws holding antenna terminal strip. Remove antenna terminal strip.
4. Remove speaker plug.
5. Remove picture tube base socket.
6. Disconnect yoke plug.
7. Remove picture tube HV cap.
8. Remove four 3/8" hex head bolts holding chassis. Remove chassis.
9. Remove two 3/8" hex head screws. (top rear). Remove top and front of cabinet.
10. Remove two 7/16" hex nuts holding top front ring support of picture tube. Remove top ring.
11. Remove five 5/16" hex head bolts holding rear picture tube support. Lift up on picture tube and remove.
12. Remove one 7/16" hex nut holding one side of lower picture tube front support. Swing support to one side.
13. Remove two phillips head screws holding speaker. Remove speaker.



BLOCK DIAGRAM

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6J6	6J6	7BD	
V2	Mixer	6AG5	6AG5	7BD	
V3	Oscillator	6J6	6J6	7BF	
V4	1st Video IF	6AG5	6AG5	7BD	
V5	2nd Video IF	6AG5	6AG5	7BD	
V6	3rd Video IF	6AG5	6AG5	7BD	
V7	Video Det. -AGC Rectifier	6AL5	6AL5	6BT	
V8	Video Amp.	6AC7	6AC7	8N	
V9A	DC Restorer-Sync. Clamper	6AL5	6AL5	6BT	
B	DC Rest. -Sync. Sep. -Phase Inv.	12AU7	12AU7	9A	
C	DC Rest. -Sync. Sep. -Phase Inv.	12AX7	12AX7	9A	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11	Ratio Det.	6AL5	6AL5	6BT	
V12	AF Amp.	6AT6	6AT6	7BT	
V13	Audio Output	6V6GT	6V6GT	7AC	
V14	Sync. Amp. -Sync. Sep.	12AU7	12AU7	9A	
V15	Vert. Osc. -Vert. Disch.	6C4	6C4	6BG	
V16	Vert. Output	6K6GT	6K6GT	7S	
V17	Hor. Phase Det.	6AL5	6AL5	6BT	
V18A	Hor. AFC-Hor. Osc.	6SN7GT	6SN7GT	8BD	
B	Hor. Multivibrator	6SN7GT	6SN7GT	8BD	
V19	Hor. Output	6BG6G	6BG6G	5BT	
V20	Damper	6W4GT	6W4GT	4CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	HV Rectifier	1B3GT	1B3GT	3C	
V23	LV Rectifier	5U4G	5U4G	5T	
V24	Picture Tube	16AP4	16AP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	500		AF88K	UP4450		TVL-20	▲ Filter
B	40	500						▲ Filter
C2A	40	500		AF8K10E	UP4450			▲ Filter
B	50	200						▲ Filter
C3	40	300		AF10G	UP5030			Output Decoupling
C4A	20	450		AF4444J	UP8DJ1112			▲ Decoupling
B	10	450						■ Vert. Osc. Decoupling
C	10	450						▲ Vert. Output Decoupling
D	10	200						V. Amp. Screen Bypass
C5	500	6		PRS6/500	BRH605A		TVA-10	Bias Filter
C6	4	50		PRS150/4	BR550		TVA-13	Stabilizing Cap.
C7	100	50		PRS50/100	BRH501		TVA-17	Vert. Output Cathode Bypass
C8	360					GP2K-390		Ant. Coupling
C9	360					GP2K-390		Ant. Coupling §
C10	360					GP2K-390		RF Cathode Bypass
C11	360					GP2K-390		RF Filament Bypass
C12	360					GP2K-390		RF Plate Decoupling
C13	1							RF Coupling
C14	22					NPOK-22		RF Coupling
C15	5000					811-005		Mixer Screen Bypass
C16	360					GP2K-390		Mixer. Filament Bypass
C17	1							Osc. Coupling
C18	4.7					NPOK-4.7		Osc. Feedback
C19	4.7					NPOK-4.7		Osc. Feedback
C20	360					GP2K-390		Osc. Filament Bypass
C21	360					GP2K-390		Decoupling
C22	360					GP2K-390		Switch Bypass
C23	360					GP2K-390		Switch Bypass
C24	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C25	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C26	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Decoupling
C27	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C28	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C29A	2000			1467-002	1W5D2	GP2M-002	29C5	2nd V. IF Decoupling
B	2000			1467-002	1W5D2	GP2M-002		2nd V. IF Fil. Bypass
C30	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C31A	2000			1467-002	1W5D2	GP2M-002	29C5	3rd V. IF Cathode Bypass
B	2000			1467-002	1W5D2	GP2M-002		3rd V. IF Decoupling
C32	5000			1467-005	1D5D5	811-005	29C1	3rd V. IF Fil. Bypass
C33	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C34	.25	200		P288-25	GT2P25		TC-2	AGC Filter
C35	1.5					NPOK-1.5		IF Coupling
C36	47							Fixed Trimmer
C37	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C38	180			1468-0002	5W5T2	GP2K-180	1FM-32	IF Coupling
C39	5000			1467-005	1D5D5	811-005	29C1	DAGC Decoupling
C40	5	300		1468-000005	5W5V5	NPOK-5	MS-55	V. Diode Filter
C41	5000			1467-005	1D5D5	811-005	29C1	V. DET. -AGC Fil. Bypass
C42	10000			P488-01	PTE4S1	821-01	36C1	Bias Filter
C43	680			1468-00075	1W5T7	GP2K-680	1FM-37	V. Amp. Cathode Bypass
C44	470			1468-0005	5W5T5	GP2K-470	1FM-35	V. Amp. Cathode Bypass
C45	5000			1467-005	1D5D5	811-005	29C1	V. Amp. Screen Bypass
C46	100			1469-0001	5R5T1	N750L-100	MS-31	Fixed Trimmer
C47	.1	200		P288-1	PTE4P1		TM-1	Video Coupling
C48	2.2							S. IF Coupling
C49	68			1468-000075	5W5Q7	GP1K-68	1FM-475	S. IF Grid Filter
C50	.02	600		P688-02	PTE6S2		TM-12	S. IF Decoupling
C51	5000			1467-005	1D5D5	811-005	29C1	S. IF Screen Bypass
C52	.02	600		P688-02	PTE6S2		TM-12	S. IF Decoupling
C53	330	1000		1468-00035	5W5T3	GP2K-330	1FM-335	Diode Load Cap.
C54	5000			1467-005	1D5D5	811-005	29C1	RF Bypass
C55	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	De-emphasis

CAPAC

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEM: TELE-TONE PART No.	REPLACEM: AEROVOX PART No.	C
C56	.01	600		P688-01	P
C57	.005	600		P688-005	P
C58	.002	600		P688-002	P
C59	.01	600		P688-01	P
C60	.05	600		P688-05	P
C61	.005	600		P688-005	P
C62	.05	600		P688-05	P
C63	100	500		1468-0001	5
C64	390	500		1468-0004	5
C65	.002	600		P688-002	P
C66	.005	600		P688-005	P
C67	.005	600		P688-005	P
C68	1500			1467-0015	M
C69	4700	500		1467-005	1I
C70	.05	600		P688-05	P
C71	.1	400		P488-1	P
C72	120	500		1468-00015	5
C73	5	1500			
C74	120	500		1468-00015	5
C75	.002	600		P688-002	P
C76	.25	400		P488-25	G
C77	.02	400		P488-02	P
C78	.05	600		P688-05	P
C79	180	500		1468-0002	5
C80	2200	500			
C81	680	500			M
C82	.05	600		P688-05	P
C83	.25	200		P488-25	G
C84	270	500		1467-00025	5
C85	270	500		1467-00025	5
C86	1000	500		1467-001	M
C87	1000	500		1467-001	M
C88	.01	600		P688-01	P
C89	.05	600		P688-05	P
C90	3900	500			
C91	.005	600		P688-005	P
C92	.05	600		P688-05	P
C93	330	500		1468-00035	5
C94	390	500		1468-0004	5
C95	270	500		1468-00025	5
C96	.15	400		P488-15	
C97	.05	600		P688-05	P
C98	.25	600		684-25	G
C99	.25	400		P488-25	G
C100	500	10000			
C101	500	10000			
C102	500	10000			
C103	.01	400		P488-01	P
C104	.01	400		P488-01	P
C105	.1	400		P488-1	P

* Used only in models with serial numbers earlier t
† Used only in models with serial numbers later tha
‡ Models earlier than serial number 16- 935 uses 1C
§ Not used in all models.

C

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: IRC PART No.	
R1A	500KΩ	1/2	TVC-113D	Q13-133	M
B	Switch		Not Req.	76-1	S
R2A	1 Meg.	1/2	TVC-114D	B11-137 *	
B	50KΩ	1/2		B11-123 *	T
C	Shaft End			E187 *	
R3A	750Ω	1/2	TVC-115D		T
B	100KΩ	1/2			
R4	2.5 Meg.	1/2	TVC-110D	Q11-239	M
R5	1500Ω	4	TVC-112D		1
R6	5000Ω	1/2	TVC-111D	Q11-114	M
R7	500Ω	2		W-400	4

* Additional parts to be used with "Concentrikit".

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE PART No.	REPLACEMENT DATA: IRC PART N
R8	330Ω	1/2		
R9	56Ω	1/2		
R10	1000Ω	1/2		BTS-100
R11	4700Ω 5%	1/2		BTS-470
R12	1 Meg. 20%	1/2		
R13	1000Ω 20%	1/2		BTS-100
R14	27KΩ 20%	1/2		
R15	27KΩ 20%	1/2		
R16	47Ω 20%	1/2		
R17	6200Ω 5%	1/2		
R18	47Ω	1/2		
R19	150Ω 20%	1/2		BW-1/2-15
R20	330Ω	1/2		
R21	1000Ω 20%	1/2		BTS-100
R22	150Ω 20%	1/2		BW-1/2-15
R23	11KΩ 5%	1/2		
R24	47Ω	1/2		
R25	150Ω 20%	1/2		BW-1/2-15
R26	220KΩ	1/2		BTS-220
R27	8200Ω 5%	1/2		
R28	100Ω	1/2		
R29	1000Ω 20%	1/2		BTS-100
R30	470KΩ 20%	1/2		BTS-470
R31	150Ω 20%	1/2		BW-1/2-15
R32	47KΩ	1		BTA-47
R33	1000Ω 20%	1/2		BTS-100
R34	8200Ω 5%	1/2		BTS-820
R35	120Ω	1/2		
R36	39KΩ 5%	2		BT-2-39

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No	USE	REPLACEMENT DATA: TELE-TONE Part No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp		6J6	7BD	
V2	Mixer		6AG5	7BD	
V3	Oscillator		6J6	7BF	
V4	1st Video IF		6AG5	7BD	
V5	2nd Video IF		6AG5	7BD	
V6	3rd Video IF		6AG5	7BD	
V7	Video Det -AGC Rectifier		6AL5	6BT	
V8	Video Amp		6AC7	8N	
V9A	DC Restorer-Sync Clamper		6AL5	6BT	
B	DC Rest -Sync Sep -Phase Inv		12AU7	9A	
C	DC Rest -Sync Sep -Phase Inv		12AX7	9A	
V10	Sound IF Amp		6AU6	7BK	
V11	Ratio Det		6AL5	6BT	
V12	AF Amp		6AT6	7BT	
V13	Audio Output		6V6GT	7AC	
V14	Sync Amp -Sync Sep		12AU7	9A	
V15	Vert Osc -Vert Dasch		6C4	6BG	
V16	Vert Output		6K6GT	7S	
V17	Hor Phase Det		6AL5	6BT	
V18A	Hor AFC-Hor Osc		6SN7GT	8BD	
B	Hor. Multivibrator		6SN7GT	8BD	
V19	Hor. Output		6BG6G	5BT	
V20	Damper		6W4GT	4CG	
V21	HV Rectifier		1B3GT	3C	
V22	HV Rectifier		1B3GT	3C	
V23	LV Rectifier		5U4G	5T	
V24	Picture Tube		16AP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TELE-TONE Part No.	REPLACEMENT DATA: AEROVOX Part No.	REPLACEMENT DATA: CORNELL-DUBILIER Part No.	REPLACEMENT DATA: ERIE Part No.	REPLACEMENT DATA: SPRAGUE Part No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	500		AF88K	UP4450		TVL-20	▲ Filter
B	40	500						▲ Filter
C2A	40	500		AF8K10E	UP4450			▲ Filter
B	50	200						▲ Filter
C3	40	300		AF10G	UP5030			Output Decoupling
C4A	20	450		AF44447	UP8DJ1112			▲ Decoupling
B	10	450						■ Vert. Osc. Decoupling
C	10	450						▲ Vert. Output Decoupling
D	10	200						V. Amp. Screen Bypass
C5	500	6		PRS6/500	BRH605A		TVA-10	Bias Filter
C6	4	50		PRS150/4	BR550		TVA-13	Stabilizing Cap.
C7	100	50		PRS50/100	BRH501		TVA-17	Vert. Output Cathode Bypass
C8	360					GP2K-390		Ant. Coupling
C9	360					GP2K-390		Ant. Coupling §
C10	360					GP2K-390		RF Cathode Bypass
C11	360					GP2K-390		RF Filament Bypass
C12	360					GP2K-390		RF Plate Decoupling
C13	1							RF Coupling
C14	22					NPOK-22		RF Coupling
C15	5000					81L-005		Mixer Screen Bypass
C16	360					GP2K-390		Mixer. Filament Bypass
C17	1							Osc. Coupling
C18	4.7					NPOK-4.7		Osc. Feedback
C19	4.7					NPOK-4.7		Osc. Feedback
C20	360					GP2K-390		Osc. Filament Bypass
C21	360					GP2K-390		Decoupling
C22	360					GP2K-390		Switch Bypass
C23	360					GP2K-390		Switch Bypass
C24	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C25	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C26	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Decoupling
C27	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C28	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C29A	2000			1467-002	1W5D2	GP2M-002	29C5	2nd V. IF Decoupling
B	2000			1467-002	1W5D2	GP2M-002		2nd V. IF Fil. Bypass
C30	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C31A	2000			1467-002	1W5D2	GP2M-002	29C5	3rd V. IF Cathode Bypass
B	2000			1467-002	1W5D2	GP2M-002		3rd V. IF Decoupling
C32	5000			1467-005	1D5D5	81L-005	29C1	3rd V. IF Fil. Bypass
C33	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C34	25	200		P288-25	GT2P25		TC-2	AGC Filter
C35	1.5					NPOK-1.5		IF Coupling
C36	47							Fixed Trimmer
C37	270	1000		1468-00025	5W5T25	GP2K-270	1FM-325	IF Coupling
C38	180			1468-0002	5W5T2	GP2K-180	1FM-32	IF Coupling
C39	5000			1467-005	1D5D5	81L-005	29C1	DAGC Decoupling
C40	5	300		1468-000005	5W5V5	NPOK-5	MS-55	V. Diode Filter
C41	5000			1467-005	1D5D5	81L-005	29C1	V. DET.-AGC Fil. Bypass
C42	10000			P488-01	PTE4S1	821-01	38C1	Bias Filter
C43	680			1468-00075	1W5T7	GP2K-680	1FM-37	V. Amp. Cathode Bypass
C44	470			1468-0005	5W5T5	GP2K-470	1FM-35	V. Amp. Cathode Bypass
C45	5000			1467-005	1D5D5	81L-005	29C1	V. Amp. Screen Bypass
C46	100			1469-0001	5R5T1	NT50L-100	MS-31	Fixed Trimmer
C47	.1	200		P288-1	PTE4P1		TM-1	Video Coupling
C48	2.2							S. IF Coupling
C49	68			1468-000075	5W5Q7	GP1K-68	1FM-475	S. IF Grid Filter
C50	.02	600		P688-02	PTE6S2		TM-12	S. IF Decoupling
C51	5000			1467-005	1D5D5	81L-005	29C1	S. IF Screen Bypass
C52	.02	600		P688-02	PTE6S2		TM-12	S. IF Decoupling
C53	330	1000		1468-00033	5W5T3	GP2K-330	1FM-335	Diode Load Cap.
C54	5000			1467-005	1D5D5	81L-005	29C1	RF Bypass
C55	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	De-emphasis

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TELE-TONE Part No.	REPLACEMENT DATA: AEROVOX Part No.	REPLACEMENT DATA: CORNELL-DUBILIER Part No.	REPLACEMENT DATA: ERIE Part No.	REPLACEMENT DATA: SPRAGUE Part No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C56	.01	600		P688-01	PTE6S1	821-01	TM-11	Audio Coupling
C57	.005	600		P688-005	PTE6D5	811-005	TM-25	Audio Coupling
C58	.002	600		P688-002	PTE6D2	GP2M-002	TM-22	De-emphasis
C59	.01	600		P688-01	PTE6S1	821-01	TM-11	Audio Coupling
C60	.05	600		P688-05	PTE6S5		TM-15	Bias Filter
C61	.005	600		P688-005	PTE6D5	811-005	TM-25	Output Plate Bypass
C62	.05	600		P688-05	PTE6S5		TM-15	Sync. Coupling †
C63	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	Sync. Coupling †
C64	390	500		1468-0004	5W5T4	GP2K-390	1FM-34	Sync. Sep. Cathode Bypass †
C65	.002	600		P688-002	PTE6D2	GP2M-002	TM-22	Integrator Net.
C66	.005	600		P688-005	PTE6D5	811-005	TM-25	Integrator Net.
C67	.005	600		P688-005	PTE6D5	811-005	TM-25	Integrator Net.
C68	1500			1467-0015	1W5D15	GP2L-0015	1FM-215	Fixed Trimmer
C69	4700	500		1467-005	1D5D5	GP2M-0047	1FM-25	Vert. Osc. Grid Cap.
C70	.05	600		P688-05	PTE6S5		TM-15	Vert. Discharge
C71	.1	400		P488-1	PTE4P1		TM-1	Vert. Sweep Coupling
C72	120	500		1468-00015	5W5T15	GP2K-120	1FM-315	Hor. Sync. Coupling †
C73	5	1500						Hor. Feedback †
C74	120	500		1468-00015	5W5T15	GP2K-120	1FM-315	Voltage Divider †
C75	.002	600		P688-002	PTE6D2	GP2M-002	TM-22	Hor. Sync. Coupling †
C76	.25	400		P488-25	GT4P25		TC-2	AFC Filter †
C77	.02	400		P488-02	PTE4S2		TM-12	AFC Filter †
C78	.05	600		P688-05	PTE6S5		TM-15	AFC Plate Bypass †
C79	180	500		1468-0002	5W5T2	GP2K-180	1FM-32	Hor. Osc. Grid Cap. †
C80	2200	500				GP2M-0022		Hor. Discharge †
C81	680	500			1W5T7	GP2K-680	1FM-37	Hor. Sweep Coupling †
C82	.05	600		P688-05	PTE6S5		TM-15	Hor. Output Screen Bypass
C83	.25	200		P488-25	GT2P25		TC-2	Hor. Output Cath. Bypass
C84	270	500		1467-00025	5W5T25	GP2K-270	1FM-325	Hor. Output Screen Bypass †
C85	270	500		1467-00025	5W5T25	GP2K-270	1FM-325	Hor. Output Screen Bypass †
C86	1000	500		1467-001	1W5D1	GP2L-001	1FM-21	Hor. Sync. Coupling *
C87	1000	500		1467-001	1W5D1	GP2L-001	1FM-21	Hor. Sync. Coupling *
C88	.01	600		P688-01	PTE6S1	821-01	TM-11	AFC Filter *
C89	.05	600		P688-05	PTE6S5		TM-15	Hor. Feedback *
C90	3900	500						Fixed Trimmer *
C91	.005	600		P688-005	PTE6D5	811-005	TM-25	AFC Filter *
C92	.05	600		P688-05	PTE6S5		TM-15	AFC Filter *
C93	330	500		1468-00035	5W5T3	GP2K-330	1FM-335	Hor. MV Feedback *
C94	390	500		1468-0004	5W5T4	GP2K-390	1FM-34	Hor. Discharge *
C95	270	500		1468-00025	5W5T25	GP2K-270	1FM-325	Hor. Sweep Coupling *
C96	.15	400		P488-15				Damper Filter
C97	.05	600		P688-05	PTE6S5		TM-15	Damper Filter
C98	.25	600		684-25	GT6P25		TC-2	Damper Filter
C99	.25	400		P488-25	GT4P25		TC-2	Hor. Sweep Coupling
C100	500	10000				410-500		HV Filter
C101	500	10000				410-500		HV Filter
C102	500	10000				410-500		HV Filter
C103	.01	400		P488-01	PTE4S1	821-01	TM-11	Line Filter
C104	.01	400		P488-01	PTE4S1	821-01	TM-11	Line Filter
C105	.1	400		P488-1	PTE4P1		TM-1	Pic. Tube Cath. Dec.

* Used only in models with serial numbers earlier than serial number 16-935.
† Used only in models with serial numbers later than serial number 16-935.
‡ Models earlier than serial number 16-935 uses 10MMF in this application.
§ Not used in all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE Part No.	REPLACEMENT DATA: IRC Part No.	REPLACEMENT DATA: CLAROSTAT Part No.	INSTALLATION NOTES
R1A	500KΩ	½	TVC-113D	Q13-133	M-60-Z	Volume control
B	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions
R2A	1 Meg.	½	TVC-114D	Bll-137 *	TVC-114D	Vert. hold control, front
B	50KΩ	½		Bll-123 *		Horiz. hold control, rear
C	Shaft End			E187 *		Attach per instructions in "Concentrikit".
R3A	750Ω	½	TVC-115D		TVC-115D	Contrast control, tapped at 500Ω
B	100KΩ	½				Brightness control
R4	2.5 Meg.	½	TVC-110D	Q11-239	M-84-S	Height control
R5	1500Ω	4	TVC-112D		10-1500	Focus control-Wire Wound
R6	5000Ω	½	TVC-111D	Q11-114	M-19-S	Vert. linearity control
R7	500Ω	2		W-400	43-500	Horiz. linearity control, Wire Wound

* Additional parts to be used with "Concentrikit".

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE Part No.	REPLACEMENT DATA: IRC Part No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R8	330Ω	½			RF Cathode
R9	56Ω	½			Parasitic Supp.
R10	1000Ω	½		BTS-1000	RF Plate Decoupling
R11	4700Ω 5%	½		BTS-4700-5%	Mixer Grid Coil Shunt
R12	1 Meg. 20%	½			Mixer Grid
R13	1000Ω 20%	½		BTS-1000	Mixer Decoupling
R14	27KΩ 20%	½			Osc. Grid
R15	27KΩ 20%	½			Osc. Grid
R16	47Ω 20%	½			Osc. Cathode
R17	6200Ω 5%	½			1st Video IF Grid
R18	47Ω	½			1st Video IF Cathode
R19	150Ω 20%	½		BW-½-150	Decoupling-Wire Wound
R20	330Ω	½			AGC Network
R21	1000Ω 20%	½		BTS-1000	AGC Network
R22	150Ω 20%	½		BW-½-150	1st Video IF Decoupling-Wire Wound
R23	11KΩ 5%	½			2nd Video IF Grid Coil Shunt
R24	47Ω	½			2nd Video IF Cathode
R25	150Ω 20%	½		BW-½-150	2nd Video IF Decoupling-Wire Wound
R26	220KΩ	½		BTS-220K	AGC Network
R27	8200Ω 5%	½			3rd Video IF Grid Coil Shunt
R28	100Ω	½			3rd Video IF Cathode
R29	1000Ω 20%	½		BTS-1000	3rd Video IF Decoupling
R30	470KΩ 20%	½		BTS-470K	AGC Rect. Diode Load
R31	150Ω 20%	½		BW-½-150	Decoupling Wire Wound
R32	47KΩ	1		BTA-47K	Voltage Divider
R33	1000Ω 20%	½		BTS-1000	Bias Network
R34	8200Ω 5%	½		BTS-8200-5%	Video Det. Diode Load
R35	120Ω	½			Parasitic Supp.
R36	39KΩ 5%	2		BT-2-39K-5%	Video Amp. Plate See Notes 1 and 4

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: TELE-TONE Part No.	REPLACEMENT DATA: IRC Part No.	IDENTIFICATION CODES
R37	39KΩ 5%	2		BT-2-39K-5%	Video Amp. Plate
R38	3900Ω	1		BTA-3900	Voltage Divider See Note 2
R39	2700Ω	1		BTA-2700	Voltage Di vider
R40	22KΩ	3			Video Amp. Screen See Note 3
R41	22KΩ	1		BTA-22K	Bleeder
R42	10KΩ 20%	½		BTS-10K	Isolation
R43	10KΩ	½		BTS-10K	Picture Tube Grid See Note 4
R44	1 Meg.	½		BTS-1 Meg.	DC Rest. Load See Note 5
R45	3.3 Meg.	½		BTS-3.3 Meg.	Sync. Phase Inv. Grid See Note 6
R46	3900Ω	½		BTS-3900	Sync. Phase Inv. Cathode See Note 6
R47	5600Ω	½		BTS-5600	Sync. Phase Inv. Plate See Note 6
R48	3900Ω	½		BTS-3900	Sync. Phase Inv. Plate See Note 6
R49	1000Ω 20%	1		BTA-1000	Acc. Anode Decoupling
R50	220KΩ	½		BTS-220K	Voltage Divider
R51	22KΩ 20%	1		BTA-22K	Voltage Divider
R52	100KΩ	½			Sound IF Grid
R53	1000Ω 20%	½		BTS-1000	Sound IF Cathode
R54	47KΩ 20%	½		BTS-47K	Voltage Divider
R55	100KΩ	½		BTS-100K	Sound IF Screen
R56	1000Ω 20%	½		BTS-1000	Sound IF Decoupling
R57	220Ω 20%	½			Balancing
R58	220Ω 20%	½			Balancing
R59	15KΩ 5%	½		BTS-15K-5%	Ratio Det. Diode Load
R60	15KΩ 5%	½		BTS-15K-5%	Ratio Det. Diode Load
R61	5.1Ω	½			Ratio Det. Filament
R62	47KΩ 20%	½		BTS-47K	De-emphasis
R63	470KΩ 20%	½		BTS-470K	AF Grid
R64	330KΩ 20%	½		BTS-330K	AF Plate
R65	100KΩ	½		BTS-100K	Output Grid
R66	330KΩ 5%	½		BTS-330K-5%	Voltage Divider
R67	180KΩ 5%	½		BTS-180K-5%	Voltage Divider
R68	470KΩ 20%	½		BTS-470K	Voltage Divider
R69	470KΩ	½		BTS-470K	Voltage Divider
R70	390Ω	1		BW-1-390	Filter
R71	1 Meg. 20%	½		BTS-1 Meg.	Sync. Amp. Grid
R72	100KΩ	2		BT-2-100K	Sync. Amp. Plate
R73	3.9 Meg.	½		BTS-3.9 Meg.	Sync. Sep. Grid
R74	10KΩ	½		BTS-10K	Sync. Sep. Cathode
R75	22KΩ 20%	1		BTA-22K	Integrator
R76	8200Ω	½		BTS-8200	Integrator
R77	8200Ω	½		BTS-8200	Integrator
R78	1.8 Meg.	½		BTS-1.8 Meg.	Vert. Osc. Grid See Note 7
R79	2.2 Meg.	½		BTS-2.2 Meg.	Voltage Divider See Note 6
R80	100KΩ	½		BTS-100K	Voltage Divider See Note 6
R81	1500Ω	½		BTS-1500	Vert. Output Cathode
R82	2.2 Meg.	½		BTS-2.2 Meg.	Vert. Output Grid
R83	8200Ω 5%	½		BTS-8200-5%	Vert. Peaking See Note 8
R84	220KΩ	½		BTS-220K	Vert. Osc. Plate
R85	110KΩ	½		BTS-100K	Horiz. Phase Det. Load See Note 6
R86	110KΩ	½		BTS-100K	Horiz. Phase Det. Load See Note 6
R87	4.7 Meg.	½		BTS-4.7 Meg.	Horiz. Phase Det. Load See Note 6
R88	470KΩ	½		BTS-470K	Horiz. AFC Filter Network See Note 6
R89	27KΩ	½		BTS-27K	Feedback See Note 6
R90	560KΩ	½		BTS-560K	Horiz. AFC Grid
R91	180KΩ 5%	½		BTS-180K-5%	Horiz. AFC Cathode
R92	100KΩ 5%	½		BTS-100K-5%	Horiz. AFC Cathode
R93	8200Ω 5%	½		BTS-8200-5%	Horiz. AFC Filter Network
R94	30KΩ	½			Voltage Divider Temp. Comp.
R95	120KΩ	½		BTS-120K	Voltage Divider
R96	270KΩ	1		BTA-270K	Voltage Divider
R97	3.3 Meg. 5%	1		BTA-3.3 Meg. 5%	Voltage Divider
R98	560KΩ	½		BTS-560K	Feedback See Note 5
R99	56KΩ 20%	½		BTS-56K	Filter
R100	150KΩ	½		BTS-150K	Horiz. AFC Filter Network
R101	100KΩ 1%	½			Horiz. Osc. Grid
R102	10KΩ	½		BTS-10K	Horiz. Osc. Transformer Shunt
R103	100KΩ 5%	1		BTA-100K-5%	Horiz. Osc. Plate
R104	10KΩ	½		BTS-10K	Filter See Note 8
R105	5600Ω	½		BTS-5600	Horiz. Osc. Plate See Note 6
R106	1800Ω	½		BTS-1800	Horiz. Osc. Cathode See Note 6
R107	100KΩ	½		BTS-100K	Horiz. Discharge Grid See Note 6
R108	270KΩ	½		BTS-270K	Horiz. Discharge Plate See Note 6
R109	47Ω	½			Parasitic Supp. See Note 10
R110	1 Meg.	½		BTS-1 Meg.	Horiz. Output Grid
R111	100Ω	2		BW-2-100	Horiz. Output Cathode, Wire Wound
R112	27KΩ	2		BT-2-27K	Horiz. Output Screen
R113	27KΩ	2		BT-2-27K	Horiz. Output Screen See Note 3
R114	4700Ω	½		BTS-4700	Feedback See Note 6
R115	51Ω	1			Horiz. Linearity Network-Wire Wound
R116	4.7Ω	½			HV Rect. Filament
R117	4.7Ω	½			HV Rect. Filament
R118	2 Meg.	4			HV Rect. Load See Note 11
R119	470KΩ	1			HV Filter
R120	3300Ω 20%	1		BTA-3300	Vert. Output Decoupling See Note 3
R121	15Ω	1		BW-1-15	Bias Network, Wire Wound See Note 12
R122	1500Ω	2		BT-2-1500	Focus Coil Shunt
R123	100KΩ 20%	½		BTS-100K	Vert. Osc. Transformer Shunt See Note 13

Note 1. Models earlier than serial number 16-935 use 22KΩ 4 watt resistor in this application.
Note 2. Models earlier than serial number 16-935 use 22KΩ 1 watt resistor in this application.
Note 3. Some models use two resistors in parallel to obtain required resistance and wattage.
Note 4. Models earlier than serial number 16-935 use 220KΩ resistor in this application.
Note 5. Models earlier than serial number 16-935 use 270KΩ resistor in this application.
Note 6. Used in model earlier than serial number 16-935 only.
Note 7. Some models use 2 Meg. resistor in this application.
Note 8. Some models use 6800Ω resistor in this application.
Note 9. Models earlier than serial number 16-935 use 22KΩ resistor in this application.
Note 10. Models earlier than serial number 16-935 use 100Ω resistor in this application.
Note 11. Some model use two resistors in series two obtain required resistance and wattage.
Note 12. Some model use 22Ω resistor in this application.
Note 13. Not used in all models.

TELE-TONE
MODEL TV-285

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC at 1.67A	800VCT .180ADC	5VAC at 3A	6.3VAC at 1.5A	TTR-170D			
		SEC. 4	SEC. 5					
		6.3VAC at 1.35A	12.6VCT at 3.6A					

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	SEC.	REPLACEMENT DATA TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	150Ω Tap at 41Ω		TTR-157				Hor. Osc. Trans.
T3	92Ω	1000Ω	TTR-161-D	A-8111	A-3000	TBO-1	Vert. Block Osc. Trans.
T4	120Ω Tap at 95Ω	SEC. 1 16.6Ω Tap at .6Ω	TTR-172	A-8119	HVO-5	TFB-4	Hor. Output Trans.
		SEC. 2 0Ω					
		SEC. 3 0Ω					
T5	590Ω	7.2Ω	TTR-153-2D	A-8116	A-3035 ②	TSO-4	Vert. Output Trans.
T6A	13Ω			DY-1	MD-1		Hor. Deflection Coil
B	62Ω						Vert. Deflection Coil
T7	480Ω		TLF-522-D		MF-2		Focus Coil

② Drill two new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	SEC.	DC RES. PRI.	SEC.	REPLACEMENT DATA TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T8	5.5KΩ	3.4Ω	310Ω	.5Ω	TTR-165-D	A-3877	A-2930	RO-9 ①	①Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA TELE-TONE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
	FIELD RES.	V. C. IMP.				
SP1	PM	3.4Ω			46A1	
	CONE DIA.	V. C. DIA.				
SP2	3 7/8" x 5 7/8"	9/16"				

FILTER CHOKE

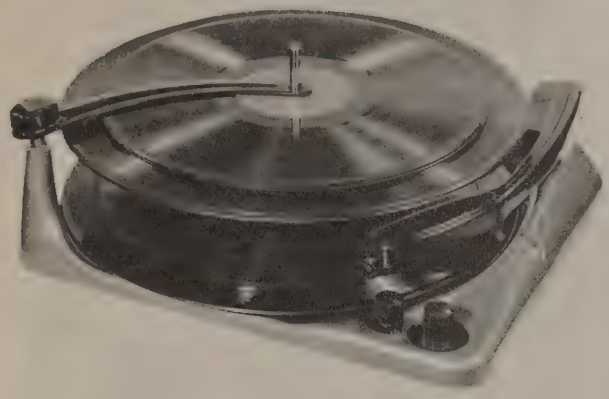
ITEM No.	RATINGS TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA TELE-TONE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.180A	39Ω	.8 Henry		C-2325 ①	C-2974 ①	TR-4200①	①Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	SEC.	REPLACEMENT DATA TELE-TONE PART No.	MEISSNER PART No.	NOTES
L2	RF Choke	.1Ω				
L3	RF End Inductance	0Ω				
L4	RF End Inductance	0Ω				
L5	RF Choke	.1Ω				
L6A	Osc. Coils	0Ω		TLF120-1D		Channel #2
B	Osc. Coils	0Ω		TLF120-2D		Channel #3
C	Osc. Coils	0Ω		TLF120-3D		Channel #4
D	Osc. Coils	0Ω		TLF120-4D		Channel #5
E	Osc. Coils	0Ω		TLF120-5D		Channel #6
F	Osc. Coils	0Ω		TLF120-6D		Channel #7
G	Osc. Coils	0Ω		TLF120-7D		Channel #8
H	Osc. Coils	0Ω		TLF120-8D		Channel #9
I	Osc. Coils	0Ω		TLF120-9D		Channel #10
J	Osc. Coils	0Ω		TLF120-10D		Channel #11
K	Osc. Coils	0Ω		TLF120-10D		Channel #12
L	Osc. Coils	0Ω		TLF120-10D		Channel #13
L7	1st Video IF	.2Ω				
L8	Fil. Choke	0Ω				
L9	1st Video IF Plate Choke	1.5Ω				Wound on 1.5 Meg. resistor.
L10	2nd Video IF	.2Ω				
L11	Fil. Choke	0Ω				
L12	2nd Video IF Plate Choke	1.5Ω				Wound on 1.2 Meg. resistor.
L13	3rd Video IF	.2Ω				
L14	Fil. Choke	0Ω				
L15	Sound Trap	0Ω				
L16	3rd Video IF Plate Choke	1.5Ω				
L17	4th Video IF	.2Ω				
L18	Peaking	4.5Ω				Inductance-120 microhenries
L19	Peaking	11Ω				Inductance-600 microhenries
L20	Peaking	6.6Ω				210 microhenries, wound on 18KΩ resistor.
L21	Peaking	10Ω				Inductance-300 microhenries
L22	4.5MC Trap	1Ω				
L23	Sound IF	1.6Ω				
L24	Ratio Det. Trans.	4.5Ω	2.5Ω			
L25	Width Cont.	.5Ω				
L26	Hor. Linearity	5Ω				

MISCELLANEOUS

ITEM No.	PART NAME	TELE-TONE PART No.	NOTES
M1	RF Tuner		Type AGC. .25A
M2	Fuse		Permanent Magnet Type
M3	Ion Trap		Interlock
M4	Switch		Hor. Lock. (10-160MMF), Hor. Freq. (40-370MMF), Hor. Drive (40-370MMF)
	Trimmer Strip		



V-M MODEL 402-D

V-M MODEL 400-D

MODELS 402-D AND 400-D

V-M
MODELS 402-D AND 400-D

DESCRIPTION

The models 400-D and 402-D are essentially the same units with the exception of the baseplates and operating control knobs. These units are designed to play automatically up to ten 12-inch, twelve 10-inch, or ten records intermixed. The changers will shut off automatically at the completion of the last record.

These models are designed to play the Standard 78 R.P.M. or the new Long-Play 33⅓ R.P.M. records.

***Manufactured by* V-M CORPORATION • BENTON HARBOR, MICHIGAN**

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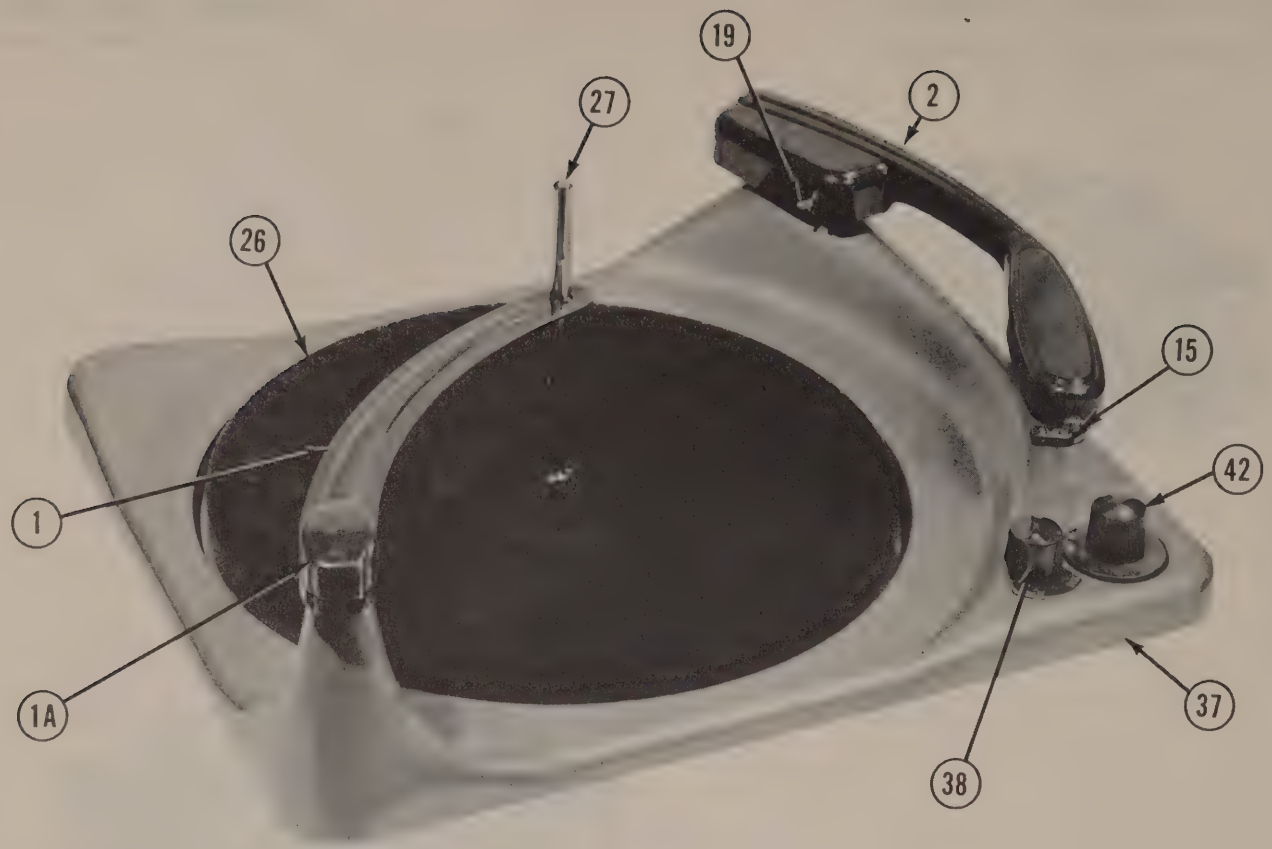

FIGURE 3—TOP VIEW

PREPARING FOR OPERATION

POWER SUPPLY: Connect only to 110-120 volts, 60-cycle, unless otherwise specified.

SHIPPING BOLTS: Before placing in operation, the machine must be floated freely on the mounting springs. During shipping, the mechanism is secured by means of the two shipping bolts (47). To float the changer, remove the turntable by lifting it straight up the spindle. Turn the two shipping bolts in a clockwise direction, as far as they will go, and replace the turntable. Before the turntable can be fully seated, the idler wheel (56) must be gently pushed back out of the way to prevent damage to the rubber tire.

OPERATING

LOADING: (Refer to Figure 3 for the following reference numbers)

Pull the record support knob (1A) straight until the record support arm (1) clears the spindle. Swing the record support in either direction until the pin in the shaft drops into the locating groove. Place as many as ten 12-inch, twelve 10-inch, or ten records intermixed on the offset shoulder on the spindle. Steady the record with one hand and replace the record support over the spindle. Gently press down on the record support knob until records are held parallel with the turntable. This is true for both the Standard 78 R.P.M. and the new Long-Play 33⅓ R.P.M. records.

STARTING: If Long-Play 33⅓ R.P.M. records are to be played, turn the motor control knob (38) so the dot on the knob is in the position marked "Slow." Rotate the cartridge lever (15) to the *left*. In this position, the cartridge is set for 33⅓ R.P.M. records. "Slow," which is indicated on the lever (15), will be facing upward.

For standard 78 R.P.M. records, turn the motor control knob (38) to the position marked "Standard" and rotate the cartridge lever (15) to the *right* to the position marked "Standard." The changer is now ready for the automatic operation.

Turn the control knob (42) clockwise to "Rej." and release. The changer will now operate automatically until the last record has been played, at which time the control knob (42) turns to the "Off" position, the pickup arm (2) returns to the rest, and the machine automatically stops.

REJECTING: To reject a record at any time while it is playing, turn the control knob to "Rej." and release.

UNLOADING: To remove records from the turntable, lift up on the record support knob and swing the record support in either direction until the pin in the shaft drops in the locating groove. Carefully lift the entire stack of records straight up.

CAUTION: When loading or unloading the changer, use care to prevent bending the spindle. Records should never be left on the offset portion of the spindle as they may warp.

STOPPING: To turn off the changer before the last record has been played, turn the control knob to "Off," lift the pickup arm from the record and replace on rest.

MANUAL OPERATION: Off-size, warped records, and home recordings should be played manually. Raise the record support clear of the spindle and swing the record support in either direction until the pin in the support shaft drops into the locating groove. Carefully place a record on the turntable. For a record to pass the step on the spindle, tilt the record toward the back of the pickup arm and work the

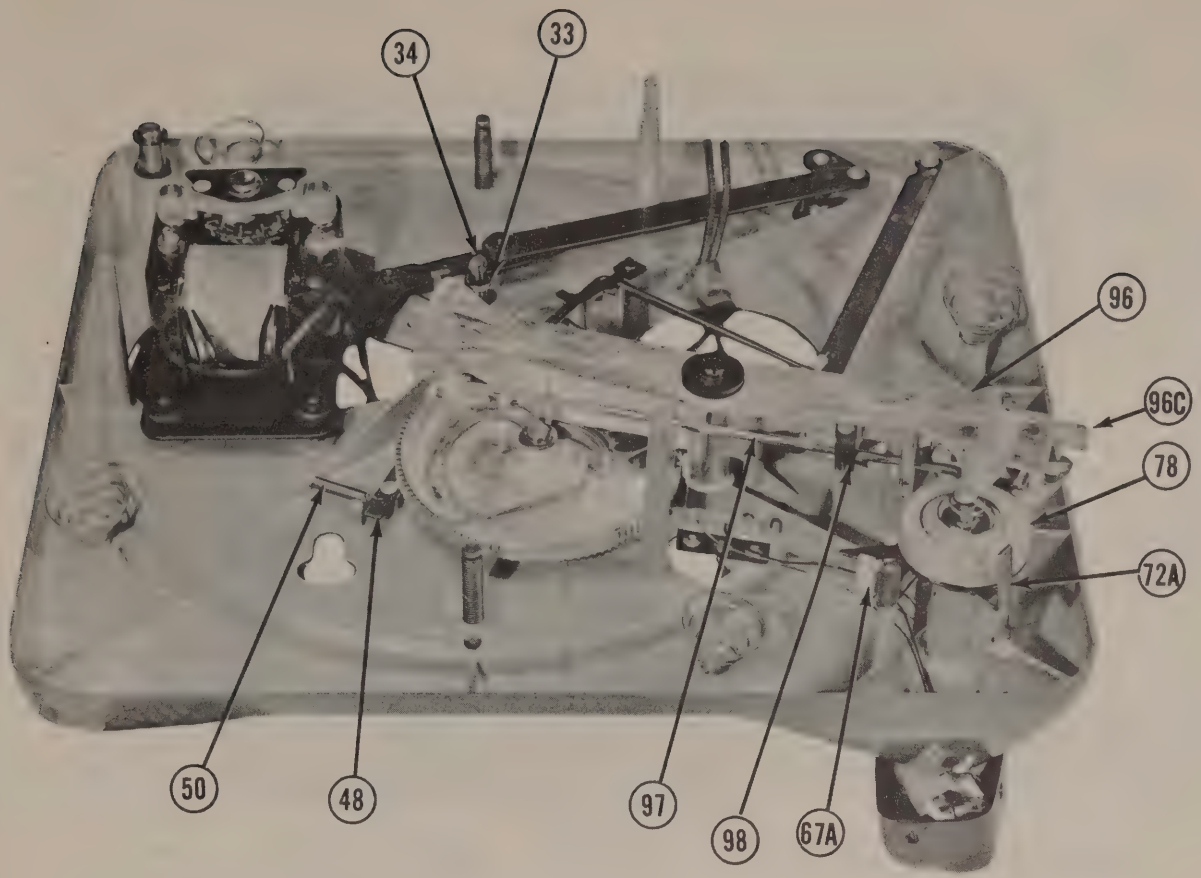

FIGURE 4—BOTTOM REAR VIEW

record carefully over the step. Place the record support (1) over the spindle, permitting it to rest on the step of the spindle. Set the motor control knob (38) and crystal (14) to their relative position, depending on what type of record, 78 or 33⅓ R.P.M., is to be played. See paragraph on "Starting." Turn the control knob (42) to the "On" position; press down on the index lever (19), which is located near the back of the pickup arm (2). Place the pickup arm on the edge of the record. Upon completion of the record, the pickup arm will return to a rest position on the rest post; that is, if the record has an eccentric cutoff groove. If the record does not have an eccentric groove, turn the control knob (42) to "Rej." and release. The arm will then return to the pickup arm rest and shut off automatically. When playing "inside-out" records, press down on the index lever (19) and move the pickup arm all the way in to the spindle before setting it down on the first playing groove of the record.

REPEATING A SINGLE RECORD: Pull the record support knob (1A) straight up until the record support arm (1) clears the spindle; then swing the record support arm in either direction until the pin in the shaft drops into the locating groove. Remove any records remaining above the offset shoulder of the spindle. The changer will now repeat the top record on the turntable until the control knob is turned to the "Off" position.

CHANGE CYCLE

At the end of the record, the oscillating action of the pickup arm in the eccentric groove causes the pawl (78A), which has been sliding along the serrated portion of the ratchet (93), to straighten, pushing against the ratchet. This pivots the ratchet and trip rod (92) away from the cam clutch pawl (88), allowing the pawl to engage with the teeth of the turntable hub, thus putting the cam in rotation, starting the change cycle.

As the main cam turns, the lift arm (96), shown in Figure 4, is actuated by the lift arm roller (104) riding in the heart-shaped groove on the bottom of the cam gear (83). One end of the lift arm controls the movement of the pickup arm, while the other end actuates the spindle assembly (27).

(Refer to the exploded view for the following reference numbers.) As the lift arm (96) moves, the lift rod (81) rides up cam surface (96A) of the lift arm (96), raising the pickup arm off the record. As soon as the pickup arm is fully raised, cam face (96B) contacts the boss extending down from the ratchet arm (78), swinging the pickup arm out to clear the records. As the pickup arm is swinging out, a projection on the set-down locator (72) snaps into a mating indentation in the ratchet arm (78) caused by the pressure of the lift arm spring (80) against the ratchet arm. When this occurs, the set down locator turns with the ratchet. Inside the ratchet arm, the safety spring (77) holds a casting on the bottom of the pickup arm locator assembly (74), against a stop surface inside the ratchet arm, so that the two assemblies move together unless the pickup arm is held during the change cycle. In this case, the safety spring allows the ratchet arm to move even though the pickup arm is held, thus preventing injury to the mechanism.

The pickup arm is moved out until a stop extending down from the hinge body (16) strikes a stop in the baseplate. The pickup arm is now clear of the records so that they are free to drop to the turntable. After the hinge body strikes the stop, preventing the pickup arm and hinge body from moving farther, the lift arm boss (96C) contacts the arm (72A) of the set-down locator plate (72), turning the ratchet arm (78) a little farther around. By this movement,

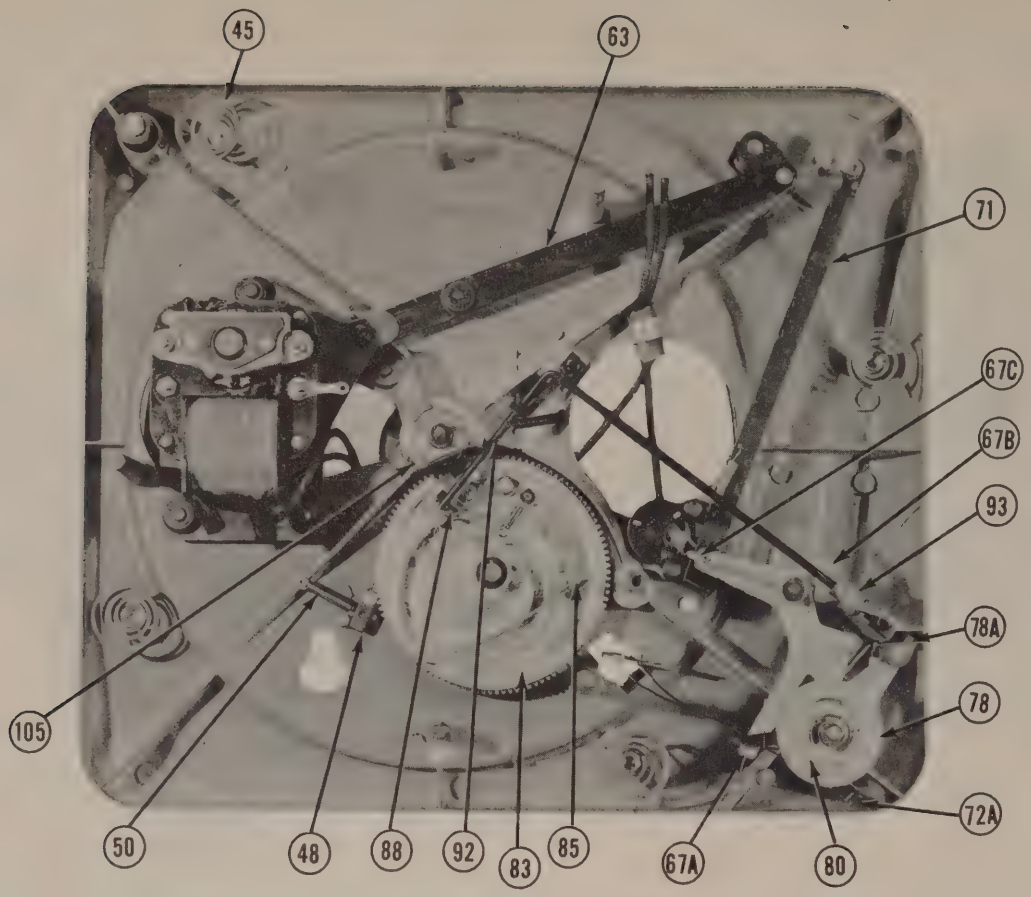

FIGURE 5—BOTTOM VIEW—LESS LIFT ARM

the following parts are also turned: The pickup arm locator plate (72), pickup arm locator (74), hinge bearing (22), and the adjusting ring (10). This causes a gap between the end of one leg of the catch (17) and the catch surface extending from the adjusting ring (10). This allows the catch spring (20) to pull the leg on the catch (17) around until it hits the stop extending out at right angles to the outer step in the leg on the adjusting ring (10). In this position, the pickup arm will set down for a 10-inch record. When a 12-inch record is dropped, the record hits the index lever (19), which, in turn, pivots the hinge cam (18) against the catch (17) moving it away from the outer step of the adjusting ring. The catch is held in this position by the step in the hinge cam, which rests on the surface of the catch, to prevent the catch from returning to its original position. The pickup arm is now set for 12-inch set down by the tension of the ring spring (11), which pulls against the hinge body (16).

At approximately the same time the cam face (96B) contacts the boss of the ratchet arm, cam surface (96D) contacts the spindle roller (34). The roller now rides up the cam, actuating the spindle assembly (27), thus dropping a record to the turntable.

The heart-shape groove in the bottom of the cam now reverses the movement of the lift arm (96), returning the spindle assembly to its original position and swinging the pickup arm in, positioning it for set down and lowering it to the record. When the lift rod (81) is completely lowered, the tension of the rod spring (80) against the ratchet arm (78) is released. The ratchet arm will now drop down forming a gap between the indentation in the ratchet arm (78) and the projection on the locator (72). This allows the pickup arm to have free movement on the record.

(Refer to Figure 5 for the following reference numbers.)

The cam clutch pawl (88) of the main cam (83) now moves against the end of the trip rod (92), holding the pawl from engaging the teeth of the turntable hub. The open section of the main cam is held, in respect to the turntable hub, by the engagement of the cam locator (48) with the two studs on the top side of the main cam, thus completing the change cycle.

After the last record has been played, the record support (1), which is flush with the offset shoulder on the spindle (27), engages the pusher (29) and keeps it from completing its full travel. This prevents the spindle pusher housing (33) from completely retracting as the roller (34) rides up the lift arm cam surface (96D). When the roller reaches the top of the cam surface, the cutoff rod (97) engages the shoulder of the spindle pusher housing (33). This causes the cutoff rod (97) to rotate 90°. As the lift arm (96) reverses its motion, the opposite end of the cutoff rod engages the control lever (67) pivoting the finger (67A) of the lever in the path of the set-down locator plate finger (72B). This prevents the pickup arm from moving in over the record; further rotation of the lift arm (96) causes the control lever to actuate the switch (64) and control knob (42) to the off position. This completes the shutoff cycle of operation.

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high-operating temperature, the changer should be lubricated as follows: (Refer to the exploded view.)

Apply Lubriplate to:

1. Hinge bearing (22).
2. Ratchet arm (78) and set-down locator plate (72).

3. Cam faces on lift arm (96), lift arm bearing, and lift arm cut-off rod bearings.
4. Between lever spring (98) and cut-off rod (97).
5. Heart-shape cam track on cam (83) and cam bearing.
6. Spindle between roller plunger (34) and roller spring housing (33), and between the roller spring housing and the spindle body.
7. Turntable ball bearing.
8. Frictional surfaces of lever (60).

Apply a Small Quantity of Light Oil to:

1. Pickup arm locator assembly bearing (74) and ball bearing in pickup arm post.
2. Ratchet pawl (78A) bearing.
3. Trip rod (92) bearings.
4. Control lever bearing (67).
5. Turntable and spindle bearing.

ADJUSTMENTS

PICKUP ARM SET-DOWN: (Refer to the exploded view)

The set-down position of the needle is adjusted by means of the two adjusting screws (12 and 13). If the needle is setting down too far out on the record, loosen the back screw (12) about ¼ turn and tighten the front screw (13) to lock the adjustment in place. If the needle is setting down too far in on the record, loosen the front screw and tighten the back screw.

PICKUP ARM HEIGHT: (Refer to the exploded view)

The pickup arm height is adjusted by the screw (21) located on top of the pickup arm lift rod (81). Turn the screw out or in until the underneath side of the pickup arm clears the rest by ⅛" to 3/16".

PICKUP ARM WEIGHT: (Refer to the exploded view)

With the pickup arm control lever (15) in the slow position, the needle pressure should be between 6 and 10 grams. If the pressure is in excess of 10 grams, bend the drilled end of the hinge bracket (16A) *away* from the hinge bearing assembly (16). If the pressure is less than 6 grams, the needle may not track in the record grooves. To correct this condition bend the drilled end (16A) of the hinge bracket *forward* in the direction of the hinge bearing assembly.

There is no adjustment for "Std." play pressure inasmuch as the pickup arm is designed to give this needle pressure.

SERVICE INFORMATION

CONTROL KNOB CANNOT BE TURNED TO "ON" POSITION:

Machine shut off during cycle:

Turn the turntable clockwise, by hand, until the control knob is free.

TURNTABLE DOES NOT REVOLVE WHEN CONTROL KNOB IS TURNED TO "ON" POSITION:

1. Machine stalled in cycle:

   Turn the turntable clockwise by hand until it starts rotating under its own power.

2. No current at motor:
   (a) Check to determine if current is reaching AC leads of changer.
   (b) Check the switch to determine if it is closing.
   (c) Check wiring and soldered terminals in the changer.

3. Motor defective.

   Remove turntable to allow motor to operate without load. If current is reaching motor and pulley does not rotate, the motor is defective. Repair or replace.

4. Motor idler wheel not engaging turntable rim. If motor pulley is turning but turntable is not:
   (a) Check motor idler assembly to determine if it is free to contact the motor pulley and the turntable.
   (b) Wipe off the inside rim on the turntable to remove flock, or if oily, clean the turntable rim and rubber tire of the idler wheel (56) (shown in exploded view) with carbon tetrachloride.
   (c) Spring (57) loose; not holding idler wheel in contact with motor shaft.

CHANGER DOES NOT CYCLE WHEN THE CONTROL KNOB IS TURNED TO THE "REJ." POSITION: (Refer to Figure 5)

1. Manual reject not actuating the trip. Turn the control knob to the "Rej." position, hold, and see if the leg (67B) on the control lever (67) is contacting the stud on the ratchet (93) and turning the trip rod (92) sufficiently to allow the trip rod to disengage the clutch pawl (88).

2. Trip not actuating clutch:

   When the trip rod (92) is turned, and the clutch pawl (88) does not move forward, engaging the teeth of the turntable, check for a loose pawl spring (87) or binding between the clutch pawl and the cam. If binding occurs, clean out foreign matter and check for freedom, but do not oil.

RECORD DOES NOT DROP WHEN CHANGER CYCLES: (Refer to the exploded view)

1. Spindle pusher shaft broken:

   If the pusher shaft (inside the spindle) is broken, the roller assembly (34) will drop out of the spindle. Loosen the set screws (105) (Fig. 5) and remove the spindle assembly (27). Replace with a new spindle unit.

2. Pusher in spindle not moving far enough forward to eject a record. The pusher (29) should move up inside the spindle body, then move forward until it has reached a point flush with, or a maximum of, .010" beyond the spindle body. To assure that the pusher is all the way forward, the spindle roller (34) should be raised high enough by the lift arm (96) at the top of the cam face to slightly compress the roller spring inside the pusher housing (33). (See "Turntable Stalls During Cycle.") If the roller spring is compressed and the pusher (29) does not move far enough forward to eject a record, the spindle should be replaced. If a record is not pushed completely off the ledge, it may hang up on the spindle momentarily, then drop on the pickup arm when it moves in over the turntable.

3. Lift Arm Screw Loose:

   Check screw (102) to determine if it is turned all the way in.

4. Pusher Raises Outside Spindle Body:

   When the changer cycles, the pusher (29) should first raise up inside the spindle body, then move forward inside the center hole in the record. If the pusher raises outside the spindle body, it will raise the record instead of pushing it off the spindle ledge. Remove the spindle and replace with a complete new spindle assembly.

5. Lift Arm Roller Broken Off:

   If the lift arm roller (104) is broken off, the lift arm (96) will not turn when the cam revolves.

A PHOTOFACT "EXPLODED" VIEW

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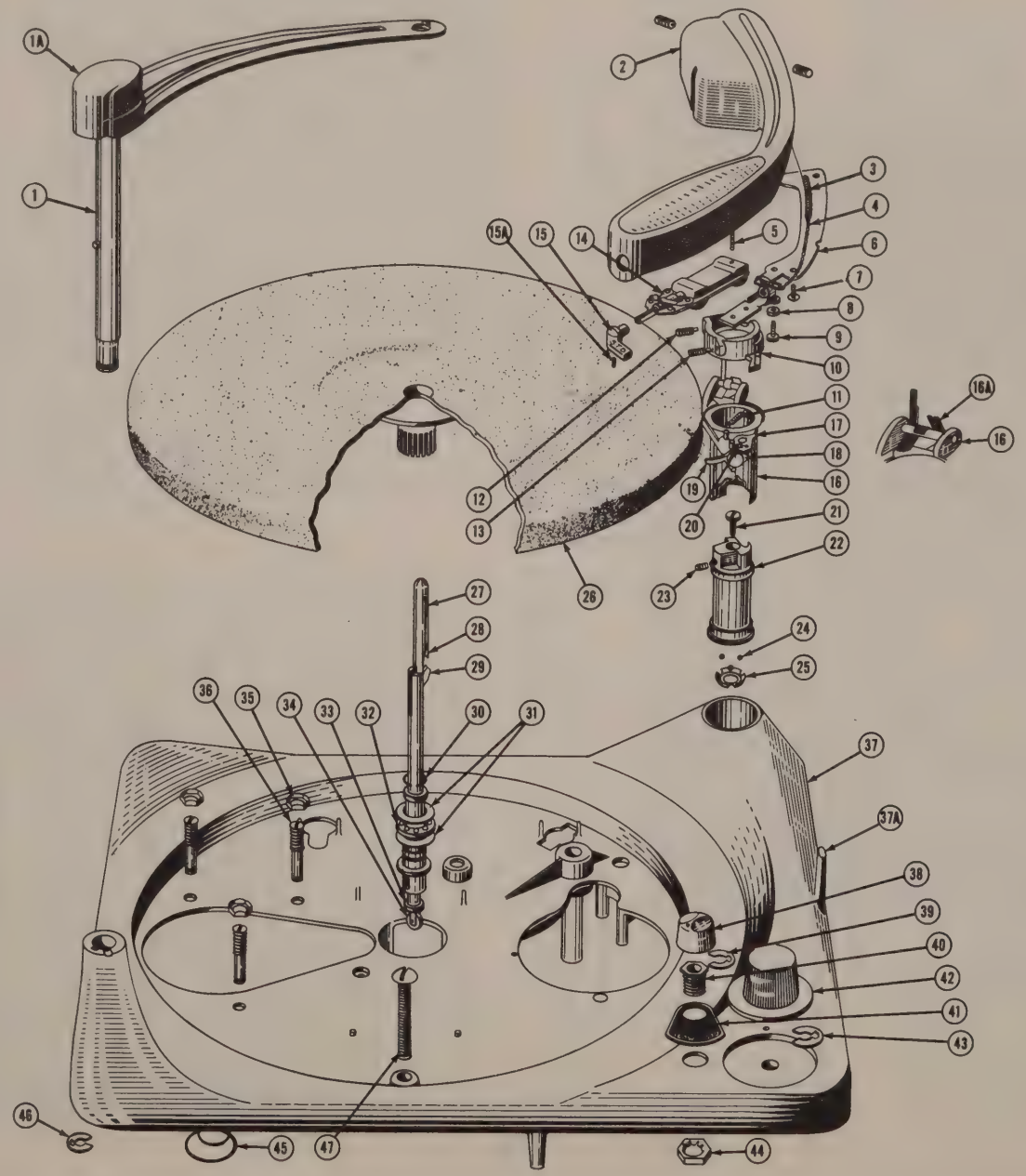

EXPLODED VIEW—V-M 402-D

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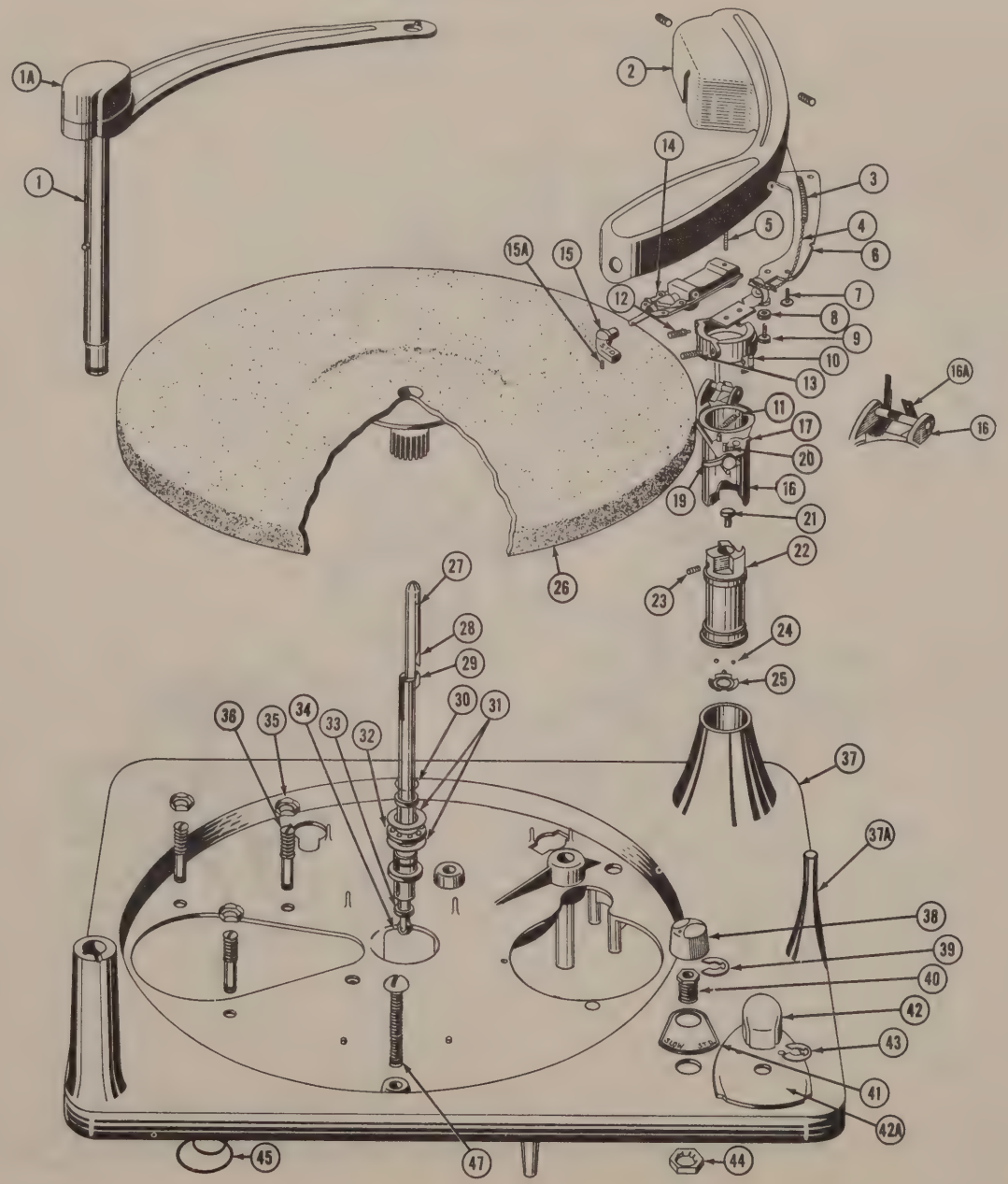

EXPLODED VIEW—V-M 400-D

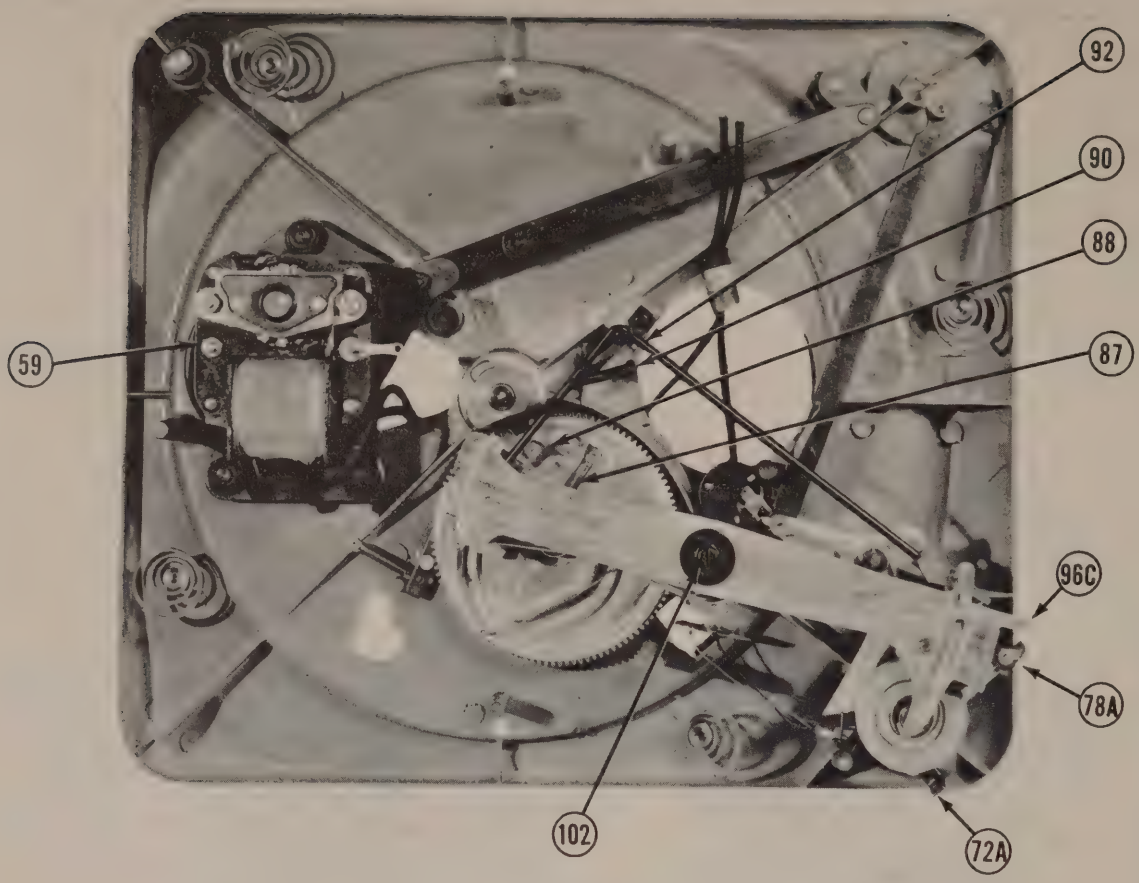

FIGURE 6—BOTTOM VIEW

TWO RECORDS DROP AT ONCE: (Refer to the exploded view and Figure 3)

1. Hole in Record Too Large:

   Check the diameter of the hole in the record. An oversize hole will cause two records to drop at once.

2. Spindle Slide Not Fully Down:

   If the spindle slide (28) is not all the way down, more than one record may be dropped at a time:

   (a) Check the slide to be sure it is free and does not bind at any point. Clean out foreign matter or straighten if necessary. Do not oil.

   (b) When records are placed on the spindle, be sure the slide is all the way down. The slide will normally raise slightly as a record is being dropped, but it should return to place immediately.

3. Record support binding on spindle or bent out of square with the shaft.

   The record support must be able to slide freely, by gravity, down the spindle. If the support does not follow the records down as they are being ejected, two or more records may be ejected at once. If binding occurs:

   (a) Check the spindle to determine if it is straight. Bend carefully with the fingers, if necessary.

   (b) Straighten the record support (1) if it is not square with the record support shaft.

   (c) If the hole in the record support is not centered over the spindle after checking (a) and (b), bend the support shaft post on the baseplate until the hole in the record support is centered over the spindle.

   (d) When the pin in the record support shaft has just entered the slot in the record support shaft post on the baseplate, the play in the record support, as it is swung from one side to the other, should be equal on both sides of the spindle. To correct bent condition, hold the support shaft and carefully force the record support into the proper position. If the support is loose on the shaft, remove the knob and restake with hammer and punch.

4. Record Pusher Defective:

   The record pusher (29) may be deformed, etc. This may cause two records to drop at once. Replace with new spindle assembly or pusher (29).

RECORD HITS PICKUP ARM: (Refer to the exploded view)

1. Pusher in spindle not moving far enough forward to eject record. (See "Record Does Not Drop When Changer Cycles"—2.)

2. Lift Arm Screw Loose:

   Tighten lift arm screw (102).

3. Pusher Extending Beyond Outside Diameter of Spindle: Cycle changer, by hand, until roller assembly (34) is at the top of its travel. Using a new record as a gauge, pass it over spindle to see if it binds at any point. File off high points on pusher (29) with a fine file until record will pass freely over spindle.

4. Pickup Arm Not Adjusted Properly:

   The adjustment procedure for the needle set-down point is given under "Adjustments." If the hinge bearing (22) has been removed, or the hinge bearing set-screw (23) has been loosened, the relationship between the hinge bearing and the pickup arm locator assembly (74) must be reset. The procedure is as follows:

   Loosen the set-screw (23) sufficiently to allow the hinge bearing to slide on the pickup arm locator assem-

bly shaft. The set-screw may be adjusted with an Allen wrench through the hole in the adjusting ring (10) located between the two adjusting screws (12 and 13). Place a 1/32" shim between the set-down locator (72) and the ratchet arm (78). Turn the control knob to the "Off" position. Raise the pickup arm and rotate the hinge assembly counterclockwise as far as it will go. In this position the arm extending from the set-down locator should be engaged by the turned-down leg on the control lever (67). Take up all the play between the parts by pressing up on the bottom of the ratchet arm and down on the top of the hinge bearing. Tighten the hinge body set-screw (23) and remove the shim.

NEEDLE DOES NOT SET DOWN ON 10" RECORD IN PROPER POSITION: (Refer to the exploded view)

1. Pickup arm not adjusted properly. (See "Record Hits Pickup Arm"—4.)
2. Hinge catch (17) does not return to 10" record position when changer cycles:
   (a) Stop the machine in mid-cycle when the lift arm (96) has moved as far out as it will go and is about to move back to its starting position. Lift the pickup arm and see if there is a gap of at least 1/64" between the end of the leg on the catch (17) and the outside step on the adjusting ring (10). The catch should be free to allow it to be pulled forward against the stop at the end of the leg on the adjusting ring. If there is not enough gap, check the setting of the hinge body and the pickup arm locator (see "Record Hits Pickup Arm"—4.) If the setting is incorrect, the cam face on the lift arm (99), which contacts the round stud on the bottom of the ratchet arm (78), may be bent. The ratchet arm should be forced around far enough to bring the pickup arm out until the stop on the bottom of the hinge casting meets the stop in the baseplate; then, to assure that the pickup arm is out as far as it will go, the lift arm should move the ratchet arm a few degrees farther around, which will slightly compress the safety spring (77) and hold the pickup arm out firmly against the stop.
   (b) Lubricate the hinge bearing with lubriplate. Do not use heavy grease. If the bearing between the hinge bearing and hinge body binds, the safety spring will compress instead of bringing the hinge body around firmly against the stop.
3. (a) Binding between safety spring and ratchet arm:
   If the safety spring (77) binds against the ratchet arm and does not hold the casting on the bottom of the pickup arm locator assembly (74) against the stop inside the ratchet arm, irregular needle set down will result. Disassemble the pickup arm locator assembly (74) by removing the lift arm (96), loosening the hinge bearing set-screw (23), and pull the ratchet arm and pickup arm locator assemblies down from the bottom of the changer. Hold the pickup arm locator shaft in one hand, turn the ratchet arm assembly to slightly compress the safety spring, release, and see if the safety spring returns the pickup locator casting firmly against the stop surface in the ratchet arm assembly. If binding occurs, remove the safety spring to see if the pickup arm locator casting turns freely in the ratchet arm casting. Remove burrs or sharp edge on end of safety spring, stretch safety spring a little to increase tension, and replace.
   (b) Check to see if the locator plate (72) is meshing with the ratchet arm (78) when the lift rod (81) is positioned at the beginning of the sloping cam surface (96A) of the lift arm (96) in the final stage of the cycle.
   To test the meshing of the locator plate and the ratchet arm, swing the tone arm half way in toward the spindle. If the locator plate and the ratchet arm disengage when in the above position, it is necessary to reset the clearance between the locator plate and the ratchet arm. Also, it may be necessary to file off any burrs which may be present on the mating surfaces of the locator plate and the ratchet arm.
4. Hinge Catch Does Not Disengage from the Hinge Cam: When the index lever (19) has been depressed, it is held in the position until the catch (17) is disengaged. (See "Needle Does Not Set Down on 12" Record in Proper Position"—6.) When the cycle is completed, if the catch does not disengage from the hinge cam (18):
   (a) Check to determine if the leg on the catch (17) is sliding down the incline on the leg of the adjusting ring (10). (See "Needle Does Not Set Down on 12" Record in Proper Position"—6.)
   (b) The catch (17) and the hinge cam (18) are not disengaging when the catch leg is resting on the inside step on the adjusting ring. If this occurs, file the edge of the catch which contacts the hinge cam until the two parts have a clearance between them of about 1/64" when the leg on the catch is on the inside step on the adjusting ring.

NEEDLE DOES NOT SET DOWN ON 12" RECORD IN PROPER POSITION: (Refer to the exploded view)

1. Diameter of 12" record undersize:
   The set-down position of the needle for 12" records is determined by the edge of the record striking the index lever (19). If a 12" record has a diameter of less than the standard size of 11⅞", plus or minus 1/32", it may fail to depress the trip lever far enough.
2. Enlarged center hole in record:
   An enlarged center hole might fail to set the index lever because it could produce the same effect as a small record.
3. Pickup arm not adjusted properly. (See "Record Hits Pickup Arm"—4.)
4. Binding between safety spring and ratchet arm. (See "Needle Does Not Set Down on 10" Record in Proper Position"—3.)
5. Index lever does not cock when 12" record drops: Allows a 12" record to drop to the turntable and stop the changer just after it falls, before the pickup arm has a chance to move in over the record. The index lever (19) should be forced down until the step on the hinge cam (18) passes the edge of the catch (17), preventing the hinge cam and the index lever from returning to their original position. If the index lever does not stay down in a depressed position:
   (a) Check the catch (17) to see if it is free to move forward and engage the hinge cam.
   (b) If the stop on the hinge body (16) is defective, it might allow the pickup arm to move too far out, thus moving the index lever away from the spindle. This would produce the same effect as an undersize record.
6. Hinge catch does not go inside step on adjusting ring when index lever is depressed:

When the index lever (19) is tripped by a falling 12" record, the leg on the catch (17) should be moved out over the incline between the inside and outside steps on the adjusting ring leg and held in that position by the shoulder on the hinge cam (18) until the pickup arm starts to move in over the record. When this occurs, the leg on the catch should contact the incline and be moved out as it slides down the incline until the catch is disengaged and the index lever can snap back up to a horizontal position. If the leg on the catch is not moved out far enough to enable it to slide down the incline, file about a 1/64" chamfer on the edge of the catch leg which contacts the incline.

Check for binding between hinge body (16) and hinge bearing (22). Burrs on the bearing surfaces, or lack of lubrication, may prevent the hinge bearing from turning freely.

NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY:

1. Needle may be clogged by accumulation of lint, dirt, etc.
2. Ratchet arm does not disengage from the set-down locator when a cycle is completed.
   (a) There should be a 1/32" gap between the ratchet arm and the set-down locator when the machine is not in a cycle. If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the hinge bearing must be reset. (See "Record Hits Pickup Arm"—4.)
3. Hinge bearing binds.

   Place a block under the back end of the pickup arm to prevent the needle from touching the turntable. With sensitive gram scale, check the amount of force required to move the pickup arm across the turntable. The force required should not exceed 2 grams. If the pressure required is excessive:

   (a) Check the ratchet arm and set-down locator for binding. (See 2 above.)

   (b) Check the bearing in the pickup arm post for binding.

   The bearing is located below the hinge bearing (22). To inspect it, loosen the set-screw (23) in the hinge bearing. Unsolder the pickup leads and pull them out. Pull up on the hinge and pickup assemblies. Clean foreign matter or corrosion from the bearings; lubricate with light oil. (To reset position, see "Record Hits Pickup Arm"—4.)
4. Insufficient weight of the pickup arm when in "slow" position:

   If the needle does not track across the record when in "Slow" position, after 1, 2, and 3 have been checked, it may be found that the weight of the arm is not great enough to hold the needle in the grooves of the record.

   (a) Check the weight of the pickup arm with a gram scale. The weight of the arm should be between 6 and 10 grams.

CHANGER TRIPS BEFORE NEEDLE REACHES END OF RECORD:

1. Hole in record too large.

   If hole in record is too large, the groove may turn eccentric with the spindle and cause premature tripping.
2. Insufficient tension on trip spring.

   The trip spring (90) should have enough tension to pull the trip rod back to a fully engaged position if an eccentric record is being played.
3. Binding in trip rod bearings.

   With the trip released, check the trip rod for play in the bearings. It should be free to turn without binding.

CHANGER DOES NOT CYCLE WHEN RECORD HAS BEEN PLAYED: (Refer to Figure 5)

1. Binding in trip rod bearings. (See "Changer Trips Before Needle Reaches End of Record"—3.)
2. No eccentric trip groove on record:

   All standard records made today have an eccentric trip groove, but some records made in the past did not have this groove. When records of this type are being played, the control knob must be returned to "Rej." at the end of the record.
3. Ratchet pawl not engaging the ratchet sector:

   The ratchet pawl (78A) must press against the ratchet sector forcing it back when the motion of the pickup arm is reversed. If the pawl does not contact the ratchet sector or slides over it:

   (a) Check the pawl (78A) for burrs around the hole.

   (b) Be sure the pawl is free to turn on the bearing. If the drive pin is driven down too far, causing binding, the pin may be relieved by tapping up on the shank.

   (c) Check the pawl spring (79) for insufficient tension.

   (d) Check the point on the pawl. It should be sharp to enable it to dig into the ratchet teeth. Sharpen with stone, if necessary.
4. Ratchet sector too far away from ratchet pawl.

   If the ratchet sector (93) is too far away from the pawl (78A), the eccentric motion required to operate the trip will be excessive. If necessary, bend the trip bracket in slightly to reduce the distance. If the sector is too close to the pawl, excessive trip pressure will result.
5. Needle jumps out of eccentric groove in record.

   (a) Check trip pressure . . . should not exceed 8 grams. (If the pressure is excessive, see paragraph 4 immediately preceding.)

   (b) The record may be defective. The trip groove is often too shallow. Check with a record which is known to be good.

   (c) The needle point may be damaged or affected by an excessive accumulation of dust, lint, etc.

   (d) There may be binding in the pickup bearing or ratchet arm. (See 2 and 3 "Needle Does Not Track Across Record Properly.")
6. Clutch Pawl Binding on Cam Face:

   The clutch pawl (88) must be free to move forward and engage the teeth of the turntable hub when the trip rod releases it. Check for burrs or foreign matter lodged between the pawl and the cam. Do not oil as this might collect dirt and gum up the pawl.

PICKUP ARM STRIKES RECORDS ON SPINDLE WHEN IT RAISES OR PICKUP ARM REST WHEN IT MOVES OUT:

Pickup arm height not adjusted properly. (See instructions for adjusting the pickup arm height under "Adjustments.")

TURNTABLE SPEED TOO SLOW: (Refer to the exploded view)

1. Binding in turntable bearing.

   Check the turntable bearing for freedom. Hold the motor idler wheel (56) out of engagement with the

turntable and spin the turntable, by hand, to see if it turns readily and coasts for a long time. If binding occurs, remove turntable, foreign matter, and lubricate with light oil.

2. Motor pulley too small in diameter. Replace the motor pulley with one having a greater diameter.

3. Line voltage too low. The line voltage should not be less than 100 volts or the turntable may be too slow.

4. Operating temperature too low. If the machine has been stored in a cold place, or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.

TURNTABLE SPEED TOO FAST:

Motor pulley too large in diameter. Replace the pulley with one having a smaller diameter, or grind one or two thousandths off the pulley.

TURNTABLE DOES NOT ROTATE AT 33⅓ R.P.M. WHEN IN "SLOW" POSITION:

(a) Check the idler wheel bracket (58) to see if it is properly positioned when the control knob is rotated from "Std." to "Slow" position.

(b) Check idler wheel (56) to see if it is engaging the small diameter of the motor pulley.

TURNTABLE STALLS DURING CYCLE: (Refer to the exploded view)

1. Motor idler not engaging turntable. (See "Turntable Does Not Revolve When Control Knob Is Turned to 'On' Position"—4.)

2. Turntable bearing tight. (See "Turntable Speed Too Slow"—1.)

3. Operating temperature too low. (See "Turntable Speed Too Slow"—4.)

4. Line voltage too low.

   The line voltage should not be less than 100 volts.

5. Binding in drive mechanism.

   (a) Remove lift arm (96) and hold idler (56) away from the turntable, or remove idler wheel. Cycle machine, turning turntable slowly by hand. The cam should turn freely for the complete revolution without binding at any point. If binding occurs, check for foreign matter in the gear teeth, a bent cam bearing or bent spindle bushing.

   (b) Replace lift arm, loosen spindle screw (105), and raise spindle high enough to clear the lift arm cam when the machine cycles. Hold the pickup arm lift rod (81) up so the end of the lift rod does not contact the lift arm cam. Cycle the machine by hand. The entire cycle should be free, without binding at any point. If binding occurs, check the lift arm bearing for freedom and the lift arm roller to be sure it is not bent, causing binding in the cam track.

6. Binding between pickup arm lift rod and lift arm cam face. Cycle machine, stopping it halfway through the cycle just as the lift arm is about to return. Lift pickup arm and raise lift rod (81) by pulling up on the adjusting screw (13) as high as it will go. Feel the lift arm (96) for play. The lift rod may still touch the lift arm cam face, but it should not bind. If binding occurs, the lift arm bearing may be bent or the fiber washer (99) under the lift arm should be removed to lower the lift arm.

7. Spindle roller spring compressed too far. Cycle the changer and watch the relationship between the bottom of the pusher housing (33) and the roller (34). Just before the top of the lift arm cam raise is reached, the pusher housing should stop its upward motion and the roller should continue up .005" to .047" more, slightly compressing the roller spring. If the spring compresses too much, the changer may stall on the shut-off cycle. Check the lift arm bearing to determine if it is square with the baseplate. It should be 90° to the baseplate within ¼°. If it is bent, carefully pound into place with a soft mallet. If it is straight and the roller spring is being compressed too much, remove the fiber washer (99) between the lift arm and the steel washer under it.

8. Motor weak. In cases where everything checks all right, but the changer still stalls in cycle, the motor may be weak.

CHANGER CONTINUES TO CYCLE: (Refer to Figure 5)

1. Trip rod not holding clutch pawl out of engagement with the teeth on the turntable hub. The end of the trip rod (92) should contact the bent-up section of the clutch pawl (88) and push the pawl out of engagement with the teeth on the turntable hub. If the trip rod is not free to meet the clutch pawl, continuous cycling will result:

   (a) See if trip spring (90) is in place.

   (b) Insufficient tension on the trip spring (90).

   (c) Check the trip rod (92) for freedom in its bearings.

2. Defective clutch pawl (88).

3. Reject control holding trip open. Check the control knob (42), control link (71), and control lever (67) for binding to determine if the control assembly is holding the trip rod in a disengaged position with the clutch pawl.

NOISE DURING PLAYING OF RECORD:

1. Rumble:

   (a) From motor: If a low-pitched rumbling sound comes from the loud speaker while a record is being played, check the motor grommets (52) (exploded view) to be sure the motor is freely suspended on them. The motor lead wires should have slack to allow the motor to float. Motor rumble may also come from an out-of-balance motor rotor. In this case, the motor should be replaced.

   (b) From bearings: Defective turntable bearings can cause rumble. Check for foreign matter in the bearing, defective balls, binding between balls, and ball retainer; rough surface on washers. Clean ball bearing, sleeve bearing, and washers; lubricate with lubriplate or light oil.

2. Defective motor idler wheel:

   A rapid thumping sound while the motor is running may indicate a flat spot on the motor idler wheel (56) (exploded view). If this condition does not clear up after ten minutes of run-in time, remove the turntable and check the rubber tire on the idler. If the surface of the rubber tire is not smooth and even, replace the idler.

3. Defective record:

   Worn or defective records cause needle scratch and distortion of the recorded sound. If the record is warped, it may slip on the other records, causing "Wow," a waver in the recorded sound. An enlarged hole in the record can also cause "Wow."

4. Turntable scrapes:

   If a scraping sound occurs as the turntable revolves, check:

   (a) Turntable warped, causing outer rim to rise and fall.

   (b) Motor idler or mounting plate bent.

   (c) Wires beneath turntable rubbing.

5. Squeaks:

   Squeaking sound as changer operates indicates lack of oil. Lubricate points indicated under "Lubrication."

DISTORTION OF RECORDED SOUND:

1. Defective record. (See "Noise During Playing of Record"—3.)

2. Defective amplifier.
   Check phonograph amplifier and speaker.

3. Bad cartridge.

NO SOUND DURING PLAYING:

1. Defective cartridge.

2. Defective wiring.
   Check pickup leads for a shorted or open lead.

3. Defective amplifier.

EXCESSIVE RECORD WEAR:

1. Binding in pickup arm. (See "Needle Does Not Track Across Record Properly"—Nos. 2 and 3.)

2. Excessive weight of the pickup arm when playing the new L.P. 33⅓ R.P.M. records:

   (a) Check the cartridge to see if it is in the "Slow" position.

   (b) Check weight of pickup arm, while in "Slow" position, with a gram scale. The weight of the arm should not exceed 10 grams.

CHANGER DOES NOT SHUT OFF AFTER LAST RECORD HAS BEEN PLAYED: (Refer to the exploded view and Figure 6)

1. Record support binding on spindle.

   The record support (1) must rest on the off-set shoulder of the spindle or the changer will not shut off. (See "Two Records Drop at Once"—3.)

2. Cut-off rod (97) not engaging shoulder on spindle pusher housing (33).

   On the shut-off cycle, the end of cut-off rod (97) should contact the shoulder on the bottom of the spindle pusher housing (33) and turn the cut-off rod over 90°. If the end of the cut-off rod passes under the pusher housing as the machine cycles on the shut-off cycle, check:

   (a) The record support to be sure it is resting on the spindle. (See 1, above.)

   (b) The spindle to see if it is being held in place by the spindle set screws (105).

   (c) The lift arm screw (102), to be sure it is tight.

   (d) The bent-up end of the cut-off rod (97) may be short. Replace, if necessary.

PICKUP ARM DOES NOT SET DOWN ON REST AFTER LAST RECORD HAS BEEN PLAYED: (Refer to Figure 6)

Control lever does not engage set-down locator. On the shut-off cycle, the leg of the control lever (67) should catch the set-down locator (72) holding it to prevent the return spring (69) from pulling the pickup arm in. The pickup arm should be held against the stop in the baseplate. In this position, the nest in the pickup arm should be directly above the pickup rest.

CHANGER SHUTS OFF PREMATURELY: (Refer to the exploded view)

1. Spindle roller spring compressed too far. (See "Turntable Stalls During Cycle"—7.)

2. Roller spring in spindle too weak.

   When the bottom record of a stack of ten 12" records is being ejected from the spindle ledge, the roller spring (in the housing) should not compress until just before the roller reaches the top of the cam incline on the lift arm. If the roller spring is compressed under the load of a full stack of records, it may cause premature shut-off. Replace with a complete spindle assembly (27).

3. Record too thick.

   The changer is designed to play standard records. If an old-style ⅛" thick record is used, the changer will shut off instead of dropping the record.

4. Cut-off rod not being reset.

   After the shut-off cycle, when the cut-off rod (97) has been turned to throw the switch to the "Off" position, the rod should be returned to its original position the next time the machine cycles by the bent-up end of the cut-off rod contacting the round stud on one leg of the control lever (67). The flat spring (98), acting against the cut-off rod, should throw the rod against its stop on the lift arm (96) and hold it there. If the cut-off rod is not fully turned, the bent-up end next to the spindle may stick up high enough to prematurely contact the shoulder on the pusher housing (33):

   (a) Check the lever spring (98) for tension. Remove and bend slightly to increase tension, if necessary.

   (b) Lubricate the cut-off rod bearings and around the lever spring with lubriplate or oil.

   (c) Check the clearance between the end of the cut-off rod (97), which passes under the control lever (67), and the bottom of the round stud on the control lever. When the cut-off rod is in its normal operating position, it should not clear the bottom of the round stud by more than enough to completely turn the end of the cut-off rod from vertical position back to a horizontal position.

TURNTABLE CONTINUES TO ROTATE WHEN CONTROL KNOB IS TURNED TO "OFF" POSITION:

Switch defective.
Check switch for defects and replace if necessary.

PARTS LIST FOR V-M 402-D

Ref. No.	Part No.	DESCRIPTION
1	1799	Record support assembly
		1711 Knob
		1716 Cross Pin
1A	1711	Knob (part of item 1)
2	2365	Pickup arm assembly . . . Consists of:
		2392-B Pickup arm
		2378 Cable and clip assembly
		2377 Strengthener assembly
		2370 Set screw for plastic lever
		2336-9 Plastic control lever
		2317 Cartridge screw
		2308 Screw for plastic arm
		2306 Spacer
		713 Screw for mounting strengthener
		2197 Cartridge (Webster F-14) with needle
		2630 Dual needle for Webster Cartridge
		2606 Cartridge (Shure with needle)
		2628 One mill needle for Shure cartridge
		2629 Three mill needle for Shure cartridge
3	2378	Cable and clip assembly
4		
5	2317	Cartridge screw
6	2377	Strengthener assembly
7	713	Screw for mounting strengthener
8	2306	Spacer
9		Screw for mounting strengthener
10	1840	Adjusting ring assembly
11	1574	Spring
12	1580	Adjusting screw
13	1580	Adjusting screw
14	2197	Cartridge (Webster F-14) with needle
	2630	Dual needle for Webster cartridge
	2606	Cartridge (Shure) with needles
15	2336-9	Plastic Control lever
15A	2370	Set screw for plastic lever
16	2043	Hinge assembly—consists of:
		1512 Hinge bearing assembly
		1610 Set screw
		1547 Drive pin
		1575 Index cam spring
		1578 Catch
		1579 Drive pin
		2314 Bracket
		2042 Hinge body
		1581 Index cam
		1582 Index lever
		1583 Catch spring
		1621 Lever return spring
		1840 Adjusting ring assembly
		1574 Spring
		1580 Adjusting screw
		1846 Selector washer
17	1578	Catch (part of item 16)
18	1581	Index cam (part of item 16)
19	1582	Index lever (part of item 16)
20	1583	Catch spring
21	1616-B	Height adjusting screw (part of item 81)
22	1512	Hinge bearing assembly (including set screw 1610) (Item 23)
23	1610	Set screw
24	724	Ball bearing for pickup arm assembly
25	1614	Bearing spacer for hinge body assembly
26	1505-A	Turntable assembly
27	1566	Spindle assembly—consists of:
		1552 Record pusher
		1535 Pin spindle roller
		1536 Spindle roller
		1557 Spindle pusher shaft
		1559 Pusher pin
		1560 Pusher shaft spring
		1561 Roller spring housing
		1562 Roller spring
		1564 Groove pin
		1565 Roller plunger
		1687 Spring guide
28	1687	Spring guide (part of item 27)
29	1552	Record pusher
30		Wire clip
31	1568	Turntable washer
32	1569	Turntable bearing
33	1561	Roller spring housing (part of item 27)
34	1536	Spindle roller (part of item 27)
35	1568	Turntable washer
36	2358	Motor mounting screws
37	2338	Base plate assembly—consists of:
		1724 Mounting springs
		2077 Shipping bolt
		1533 Control shaft
		1895 Terminal strip
		1567 Cam bearing
		2364 Base plate
38	2198	Speed control knob
39		"C" washer
40		Speed control shaft bearing
41	2343	Escutcheon for speed control
42	2054-B	Control knob
43	1719	"C" washer for control crank
44		Control bearing nut
45	1724	Mounting spring
46	2110	"C" washer for record support arm
47	2077	Shipping bolt
48	1919	Cam locator
49		Drive pin
50	419	Cam locator spring
51	2359	Washer for motor mounting
52		Motor mounting grommet
53		"C" washer for motor mounting
54		"C" washer for idler wheel
55		Fiber washer for idler wheel
56	2635	Idler wheel
57		Idler wheel tension spring
58		Idler wheel shifting cam (part of item 59)
59	2352	Motor (Russell 117 volt, 60 cycle) (Includes 2635 idler wheel)
		Shifting cam
		Control lever
60		Control lever (part of item 59)
61	1719	"C" washer
62	2357	Rubber grommet
63	2384	Speed linkage assembly—consists of:
		2258 Rivet
		2353 Link
		2357 Grommet
		2382 Shaft and arm assembly
64	1519	A.C. Switch assembly—consists of:
		1629 Switch plate
		467 Switch
65	709-A	Screw No. 6 x 1/4" type "Z"
66	1721	Reject spring
67	2425	Control lever assembly—consists of:
		1725 Control link
		1726 Control crank
		1727 Rivet
		2424 Control lever
68	1652	"C" washer for control lever
69	1631	Locator spring
70		
71	1725	Control link
72		Set-down locator plate
73	1726	Control crank
74		Pickup arm locator assembly—consists of:
		. . . . Pickup shaft
		. . . . Pickup locator
75		Rubber bumper
76	1650	"C" washer
77	1638	Safety spring for pickup arm and hinge assembly
78	2362	Ratchet arm assembly—consists of:
		1547 Drive pin
		2323 Pawl
		2329 Pawl spring
79	2329	Pawl spring
80	1620	Spring for lift rod
81	1513	Lift rod assembly—consists of:
		1613 Lift rod
		1616-B Screw
82	1652	"C" washer for lift rod
83	2495	Cam assembly—consists of:
		94 Rivet
		120 Lug
		1547 Drive pin
		2445 Spring
		1918 Cam pawl
		1920 Cam stud sleeving
		2338 Wire spring
84	1651	"C" washer for main cam
85	2338	Wire spring
86		Fiber washer
87	2445	Spring
88	1918	Cam pawl
89	94	Rivet
90	133	Trip spring
91		Trip rod bearing
92	1534	Trip rod and ratchet assembly
		1585 Trip rod
		1590 Ratchet
93	1590	Ratchet (part of item 92)
94		Trip rod bearing
95	709-A	Screw No. 6 x 1/4 type "Z"
96	1509	Lift arm assembly—consists of:
		68 Roller drive pin
		1595 Cut-off rod
		1596 Pin 1 for cut-off rod
		1597 Roller
		1599 Lever spring
		2185 Rivet
		1846 Washer
97	1595	Cut-off rod
98	1599	Lever spring
99	1637	Fiber washer 1/64" thick
100	1922	Fiber washer 3/16" thick
101		Internal tooth lockwasher
102	277	Screw No. 8-32 x 3/8"
103		Trip bearing screw
104	1597	Roller

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12	1580	Adjusting screw
13	1580	Adjusting screw
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	2630	Dual needle for Webster cartridge
	2606	Cartridge (Shure) with needles
15	2336-9	Plastic Control lever
15A	2370	Set screw for plastic lever
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		1610 Set screw
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		1575 Index cam spring
		1578 Catch
		1579 Drive pin
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		1559 Pusher pin
		1560 Pusher shaft spring
		1561 Roller spring housing
		1562 Roller spring
		1564 Groove pin
		1565 Roller plunger
		1687 Spring guide
28	1687	Spring guide (part of item 27)
29	1552	Record pusher
30		Wire clip
31	1568	Turntable washer
32	1569	Turntable bearing
33	1561	Roller spring housing (part of item 27)
34	1536	Spindle roller (part of item 27)
35	1568	Turntable washer
36	2358	Motor mounting screws
37	2394	Base plate assembly—consists of:
		1724 Mounting springs
		2077 Shipping bolt
		1533 Control shaft
		1895 Terminal strip
		1567 Cam bearing
		2363 Base plate
38	2198	Speed control knob
39		"C" washer
40		Speed control shaft bearing
41	2343	Escutcheon for speed control
42	1711	Control knob
42A	963-26	Escutcheon for on-off reject
43	1719	"C" washer for control crank
44		Control bearing nut
45	1724	Mounting spring
46	2110	"C" washer for record support arm
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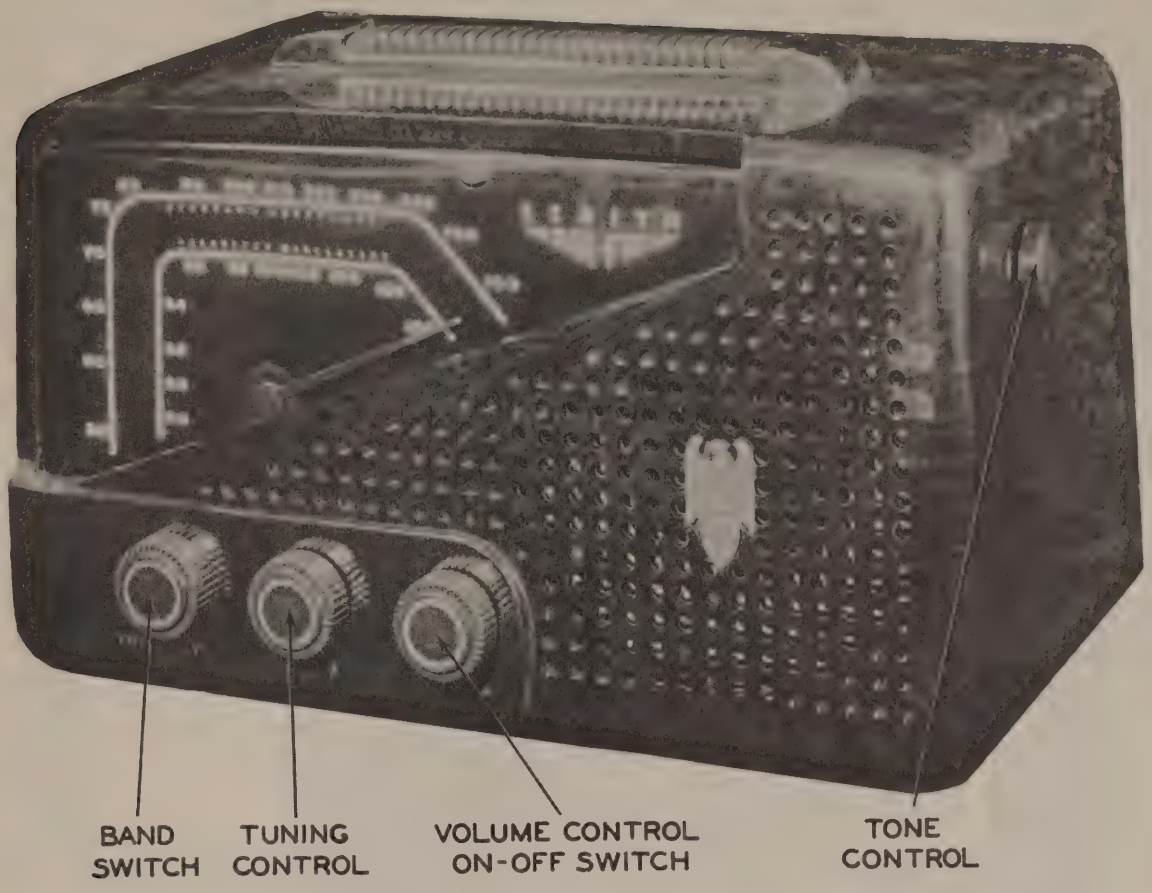
		1726 Control crank
		1727 Rivet
		2424 Control lever
68	1652	"C" washer for control lever
69	1631	Locator spring
70		
71	1725	Control link
72		Set-down locator plate
73	1726	Control crank
74	....	Pickup arm locator assembly—consists of:
		.... Pickup shaft
		.... Pickup locator
75		Rubber bumper
76	1650	"C" washer
77	1638	Safety spring for pickup arm and hinge assembly
78	2362	Ratchet arm assembly—consists of:
		1547 Drive pin
		2323 Pawl
		2329 Pawl spring
79	2329	Pawl spring
80	1620	Spring for lift rod
81	1513	Lift rod assembly—consists of:
		1613 Lift rod
		1616-B Screw
82	1652	"C" washer for lift rod
83	2495	Cam assembly—consists of:
		94 Rivet
		120 Lug
		1547 Drive pin
		2445 Spring
		1918 Cam pawl
		1920 Cam stud sleeving
		2338 Wire spring
84	1651	"C" washer for main cam
85	2338	Wire spring
86		Fiber washer
87	2445	Spring
88	1918	Cam pawl
89	94	Rivet
90	133	Trip spring
91		Trip rod bearing
92	1534	Trip rod and ratchet assembly
		1585 Trip rod
		1590 Ratchet
93	1590	Ratchet (part of item 92)
94		Trip rod bearing
95	709-A	Screw No. 6 x 1/4 type "Z"
96	1509	Lift arm assembly—consists of:
		68 Roller drive pin
		1595 Cut-off rod
		1596 Pin 1 for cut-off rod
		1597 Roller
		1599 Lever spring
		2185 Rivet
		1846 Washer
97	1595	Cut-off rod
98	1599	Lever spring
99	1637	Fiber washer 1/64" thick
100	1922	Fiber washer 3/16" thick
101		Internal tooth lockwasher
102	277	Screw No. 8-32 x 3/8"
103		Trip bearing screw
104	1597	Roller

ZENITH
MODEL 7H922 (Ch. 7FO2)



ZENITH
MODEL 7H922 (Ch. 7FO2)

ZENITH MODEL 7H922

TRADE NAME	Zenith, Model 7H922 (Ch. 7F02)		
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois		
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver with Loop Antenna		
TUBES(SEVEN)	Types 12BA6 FM RF Amp., 12AT7 Converter, 12BA6 1st IF Amp., 12BA6 FM 2nd IF Amp., 12AU6 Limiter, 19T8 DET-AVC-AF, 35B5 Power Output		
POWER SUPPLY	110-120 Volts AC	RATING	.33 Amp. at 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC	FREQ. MOD.	88-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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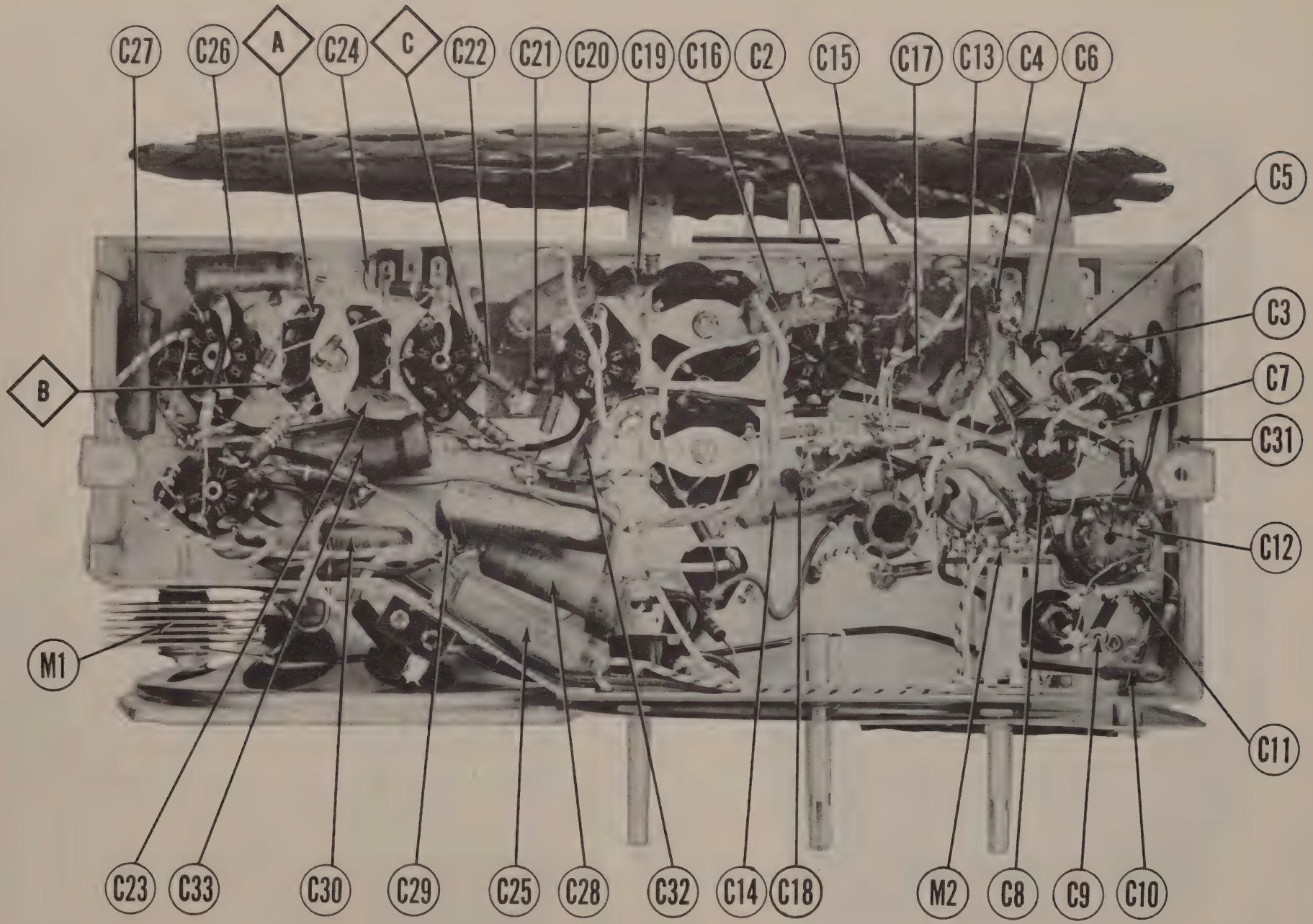
C27
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C5
C3
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C7
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C9
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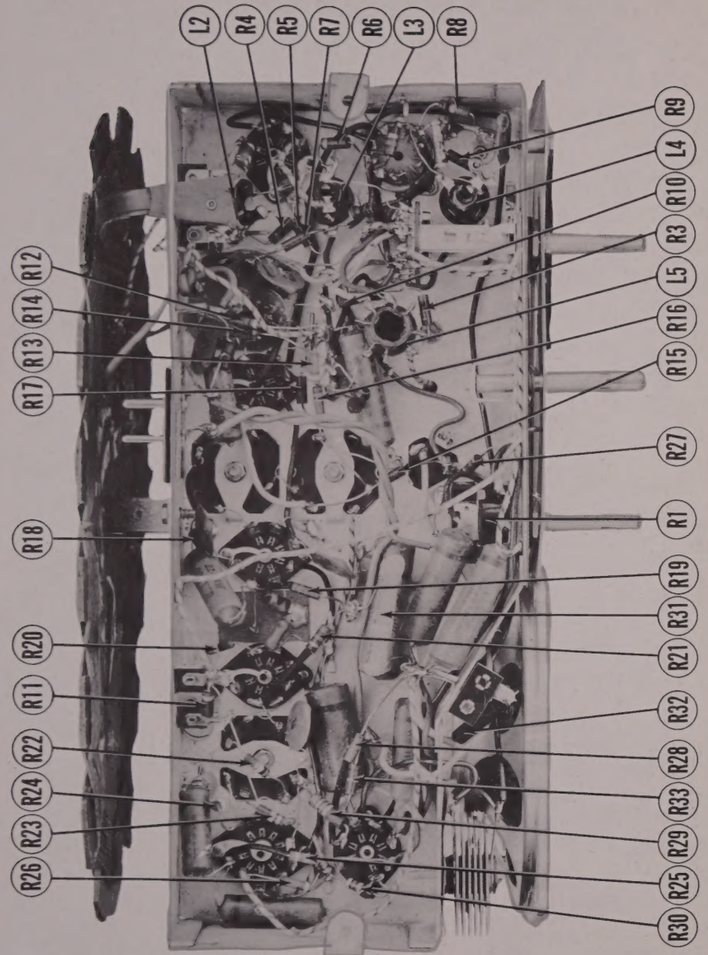

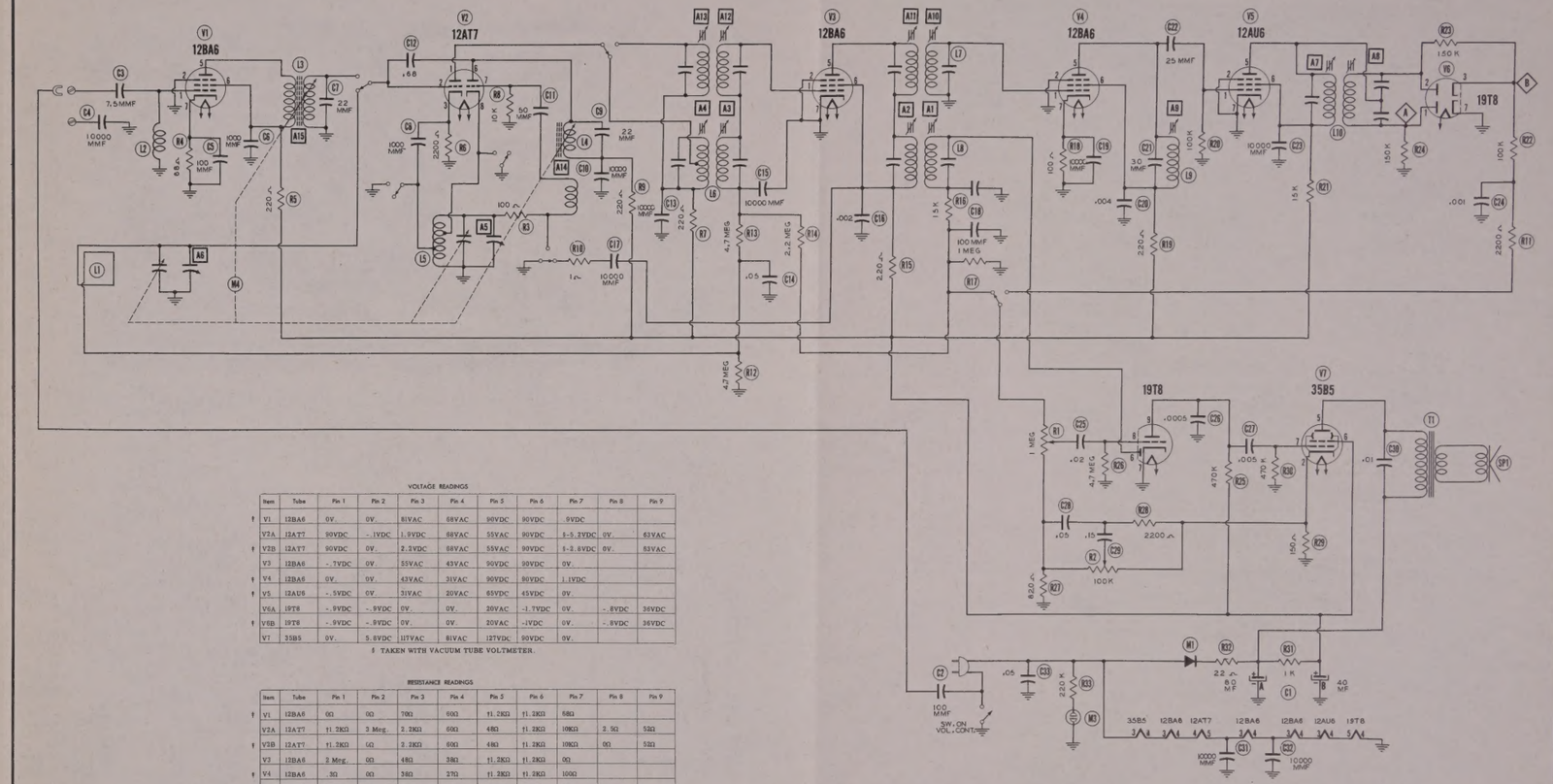

VOLTAGE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
†	V1	12BA6	0V.	0V.	81VAC	68VAC	90VDC	90VDC	9VDC		
	V2A	12AT7	90VDC	-.1VDC	1.9VDC	68VAC	55VAC	90VDC	5-5.2VDC	0V.	63VAC
†	V2B	12AT7	90VDC	0V.	2.2VDC	68VAC	55VAC	90VDC	5-5.8VDC	0V.	63VAC
	V3	12BA6	-.7VDC	0V.	55VAC	43VAC	90VDC	90VDC	0V.		
†	V4	12BA6	0V.	0V.	43VAC	31VAC	90VDC	80VDC	1.1VDC		
†	V5	12AU6	-.5VDC	0V.	31VAC	20VAC	65VDC	45VDC	0V.		
	V6A	19T8	-.9VDC	-.9VDC	0V.	0V.	20VAC	-1.7VDC	0V.	-.8VDC	36VDC
†	V6B	19T8	-.9VDC	-.9VDC	0V.	0V.	20VAC	-1VDC	0V.	-.8VDC	36VDC
	V7	35B5	0V.	5.8VDC	117VAC	81VAC	127VDC	90VDC	0V.		

† TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

	Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
†	V1	12BA6	0Ω	0Ω	70Ω	60Ω	†1.2KΩ	†1.2KΩ	68Ω		
	V2A	12AT7	†1.2KΩ	3 Meg.	2.2KΩ	60Ω	48Ω	†1.2KΩ	10KΩ	2.5Ω	52Ω
†	V2B	12AT7	†1.2KΩ	0Ω	2.2KΩ	60Ω	48Ω	†1.2KΩ	10KΩ	0Ω	52Ω
	V3	12BA6	2 Meg.	0Ω	48Ω	38Ω	†1.2KΩ	†1.2KΩ	0Ω		
†	V4	12BA6	3Ω	0Ω	36Ω	27Ω	†1.2KΩ	†1.2KΩ	100Ω		
†	V5	12AU6	100KΩ	0Ω	27Ω	18Ω	†16KΩ	†16KΩ	0Ω		
	V6A	19T8	150KΩ	150KΩ	200KΩ	0Ω	18Ω	1 Meg.	0Ω	4.7Meg.	†470KΩ
†	V6B	19T8	150KΩ	150KΩ	250KΩ	0Ω	18Ω	1 Meg.	0Ω	4.7Meg.	†470KΩ
	V7	35B5	470KΩ	150Ω	190Ω	70Ω	†270Ω	†100Ω	470KΩ		

† MEASURED FROM OUTPUT OF M1.
† TAKEN IN FM POSITION.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

When complete receiver alignment is to be performed, the order outlined should be followed.
To set dial pointer when tuning gang fully closed, see dial cord drawing.

AM ALIGNMENT

Use isolation transformer if available. If not connect a .1MFD capacitor in series with low side of signal generator and chassis. Output should be at minimum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD DUMMY ANTENNA	High side to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	455KC IF (Counter-CW)	600KC	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 1MFD to reduce hum modulation.
2.	.05MFD	"	"	1500KC	"	"	"
3.	Loop	"	1400KC	1400KC	"	A5	"
4.	.05MFD DUMMY ANTENNA	High side to pin 1 (Grid) of 12AT7 (V2). Low side to chassis.	1.7MC FM (CW)	Tuning gauge to point ⑤	DC Probe thru 3 MEG to point ⑥	A6	Position loop of several turns of insulated wire around loop for maximum output.
5.	.05MFD	"	"	600KC	DC Probe thru 3 MEG to point ⑥	A7	Adjust for maximum deflection.
6.	.05MFD DUMMY ANTENNA	High side to pin 1 (Grid) of 12AT7 (V2). Low side to chassis.	1.7MC FM (CW)	1400KC	DC Probe thru 3 MEG to point ⑥	A8	Adjust for zero reading. A positive reading only will be obtained on either side of the correct setting.
7.	.05MFD DUMMY ANTENNA	High side to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	1.7MC FM (CW)	1400KC	DC Probe thru 3 MEG to point ⑥	A9, A10, A11, A12, A13	Adjust for maximum deflection.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	VTVM CONNECT	ADJUST	REMARKS
4.	.05MFD DUMMY ANTENNA	High side to pin 1 (Grid) of 12AT7 (V2). Low side to chassis.	10.7MC FM (Unmod.)	Tuning gauge to point ⑤	DC Probe thru 3 MEG to point ⑥	A7	Adjust for maximum deflection.
5.	.05MFD	"	"	600KC	DC Probe thru 3 MEG to point ⑥	A8	Adjust for zero reading. A positive reading only will be obtained on either side of the correct setting.
6.	.05MFD DUMMY ANTENNA	High side to pin 1 (Grid) of 12AT7 (V2). Low side to chassis.	10.7MC FM (Sweep)	1400KC	DC Probe thru 3 MEG to point ⑥	A9, A10, A11, A12, A13	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 4½ modulation and 455KC sweep. Use 1½ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO SETTING	SCOPE CONNECT	ADJUST	REMARKS
4.	.05MFD DUMMY ANTENNA	High side to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	10.7MC FM (Sweep)	Point of non-interference (CW)	Vert. Amp. to Point ⑥. Low side to Point ⑤	A6, A7	Adjust A6 and A7 for 10.7MC symmetrical pattern at center of crossover lines as per Fig 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.
5.	.05MFD	High side to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	"	"	"	A12, A13	"
6.	.05MFD	"	"	"	Vert. Amp. to Point ⑥. Low side to chassis.	A9, A10, A11	Adjust for maximum amplitude and symmetry as per Fig 1.
7.	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO SETTING	SCOPE CONNECT	ADJUST	REMARKS
	.05MFD	High side thru 270Ω resistor to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	10.7MC (Unmod.)	FM	998C	DC Probe to Common ⑤	A14, A15	Adjust for maximum deflection.

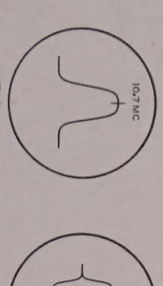


FIG. 1

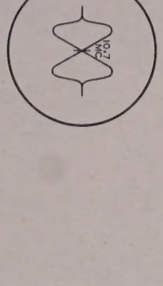


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	FM RF Amp.	12BA6	12BA6	7BK	
V2	Converter	12AT7	9A	7BK	
V3	1st IF Amp.	12BA6	12BA6	7BK	
V4	FM 2nd IF Amp.	12BA6	12BA6	7BK	
V5	Limiter	12AU6	12AU6	7BK	
V6	DET.-AVC-AF	19T8	19T8	9E	
V7	Power Output	35B5	35B5	7BZ	

CAPACITORS

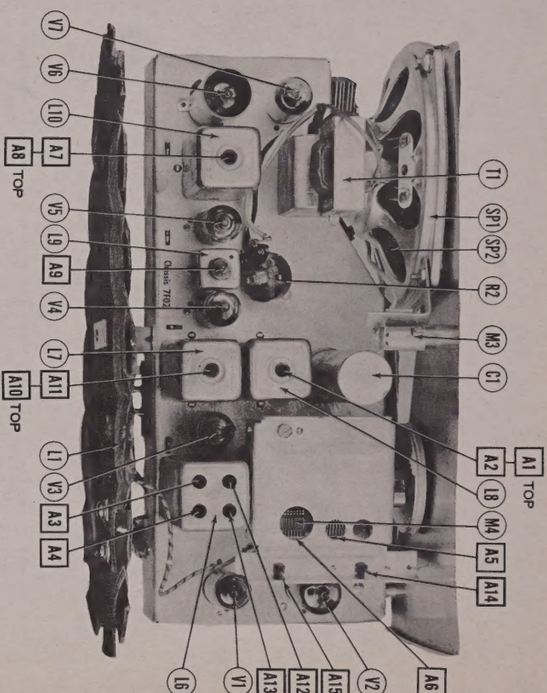
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	80	150	22-1757	AFS168D	UPE8415		D5179	■ Filter
B	40	150						▲ Filter
C2	100		22-1689	1468-0001	5W5T1	GPIK-100	1FM-31	Line Ant. Coupling
C3	7.5		22-1852	1468-00001	5W5Q1	NPOK-8.2	MS-41	Ant. Coupling
C4	10000		22-3	P488-01	PTE4S1	821-01	36C1	Ant. Isolation
C5	100		22-1689	1468-0001	5W5T1	GPIK-100	1FM-31	RF Cathode Bypass
C6	1000		22-1676	1468-001	1W5D1	GP2L-001	1FM-21	RF Decoupling
C7	22		22-1506			N080-331-22		Fixed Trimmer
C8	1000		22-1676	1468-001	1W5D1	GP2L-001	1FM-21	Conv. Cathode Bypass
C9	22		22-1506			N080-331-22		Fixed Trimmer
C10	10000		22-3	P488-01	PTE4S1	821-01	36C1	Osc. Plate Decoupling
C11	50		22-1367	1468-00005	5W5Q5	GPIK-50	1FM-45	Osc. Grid Cap.
C12	.68		22-1766					Osc. Coupling
C13	10000		22-3	P488-01	PTE4S1	821-01	36C1	Conv. Plate Decoupling
C14	.05	200	22-829	P288-05	PTE4S5		TM-15	AVC Filter
C15	10000		22-3	P488-01	PTE4S1	821-01	36C1	AVC Filter
C16	.002	600	22-1220	P668-002	PTE8D2	GP2M-002	TM-22	1st IF Decoupling
C17	10000		22-3	P488-01	PTE4S1	821-01	36C1	1st IF Decoupling
C18	100		22-1689	1468-0001	5W5T1	GPIK-100	1FM-31	Diode RF Filter
C19	10000		22-3	P488-01	PTE4S1	821-01	36C1	2nd IF Cathode Bypass
C20	.004	600	22-448	P688-004	PTE8D4	GP2M-005	TM-24	2nd IF Decoupling
C21	30		22-1768		5R5Q3		MS-43	Fixed Trimmer
C22	25		22-1507	1468-000025	5W5Q25	GPIK-25	MS-423	IF Coupling
C23	10000		22-3	P488-01	PTE4S1	821-01	36C1	Limiter Decoupling
C24	.001	600	22-887	P668-001	PTE8D1	GP2L-001	TM-21	De-emphasis
C25	.02	600	22-830	P688-02	PTE8E2		TM-12	Audio Coupling
C26	.0095	600	22-854	1468-0005	5W5T5	GP2K-500	TR-35	AF Amp. Plate Bypass
C27	.005	600	22-229	P688-005	PTE8D5	GP2M-005	TM-25	Audio Coupling
C28	.05	200	22-1158	P288-05	PTE4S5		TM-15	Tone Compensation
C29	.15	200	23-1025	P288-15				Tone Compensation
C30	.01	400	22-1126	P488-01	PTE4S1	GP2-335-01	TM-11	Output Plate Bypass
C31	10000		22-3	P488-01	PTE4S1	821-01	36C1	Conv. Filament Bypass
C32	10000		22-3	P488-01	PTE4S1	821-01	36C1	2nd IF Filament Bypass
C33	.05	400	22-1017	P488-05			TM-15	Line Filter

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	63-1646	Q11-137	AM-61-S	Volume control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions
R2A	100KΩ	½	63-2008	Q11-128	AM-49-S	Tone control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R2A per instructions

CHASSIS—TOP VIEW



SET 87
FOLDER 15

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R3	100Ω	½	63-1744		Parasitic Supp.
R4	68Ω	½	63-1737		RF Cathode
R5	220Ω	½	63-1758	BW-½-220	RF Decoupling
R6	2200Ω	½	63-1800	BTS-2200	Conv. Cathode
R7	220Ω	½	63-1758	BW-½-220	Conv. Plate Decoupling
R8	10KΩ	½	63-1838	BTS-10K	Osc. Grid
R9	220Ω	½	63-1758	BW-½-220	Osc. Plate Decoupling
R10	1Ω	½	63-1223	BW-1	1st IF Decoupling-Wire Wound
R11	2200Ω	½	63-1800	BTS-2200	AVC Network
R12	4.7 Meg.	½	63-1940	BTS-4.7 Meg.	AVC Network
R13	4.7 Meg.	½	63-1940	BTS-4.7 Meg.	AVC Network
R14	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	AVC Network
R15	220Ω	½	63-1758	BW-½-220	1st IF Decoupling
R16	15KΩ	½	63-1835	BTS-15K	Diode Filter See Note 1
R17	1 Meg.	½	63-1912	BTS-1 Meg.	Diode Load
R18	100Ω	½	63-1744		2nd FM IF Cathode
R19	220Ω	½	63-1758	BW-½-220	2nd FM IF Decoupling
R20	100KΩ	½	63-1870	BTS-100K	Limiter Grid
R21	15KΩ	½	63-1835	BTS-15K	Limiter Decoupling
R22	100KΩ	½	63-1870	BTS-100K	De-emphasis
R23	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R24	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R25	470KΩ	½	63-1898	BTS-470K	AF Plate
R26	4.7 Meg.	½	63-1940	BTS-4.7 Meg.	AF Grid
R27	820Ω	½	63-1782	BTS-820	Tone Compensation
R28	2200Ω	½	63-1800	BTS-2200	Tone Compensation
R29	150Ω	½	63-686	BW-½-150	Output Cathode-Wire Wound
R30	470KΩ	½	63-1898	BTS-470K	Output Grid
R31	1000Ω	3	63-1527	AB-1000	Filter-Wire Wound
R32	22Ω	1	63-1450		Surge Limiter-Wire Wound
R33	220KΩ	½	63-1884	BTS-220K	Series Neon

Note 1. Some models use 47KΩ resistor in this application.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	INSTALLATION NOTES
T1	2.7KΩ	3.4Ω	260Ω	.6Ω	206-634	A-3876 #	A-2928 #	RO-2 #	# Bend mounting tabs down and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: ZENITH PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-803 ††		† Drill and tap magnet frame.
SP1	PM	3.4Ω	49-634	MOD. P525-V	52A1 †	†† Remount output transformer.
	CONE DIA.	V. C. DIA.				
SP2	5 1/8"	9/16"				

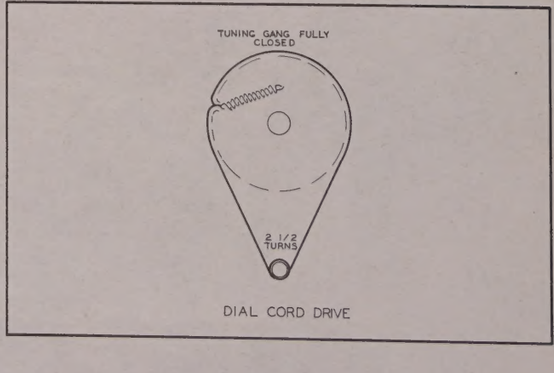
R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: MEISSNER PART No.	
L1	AM Loop Ant.	1.5Ω		8-14957		
L2	FM Ant.	0Ω		8-15690		
L3	FM RF	0Ω	0Ω	8-13871		
L4	FM Osc.	0Ω		8-15733		
L5	AM Osc.	6.5Ω		8-15694	14-1060	
L6	1st AM-FM IF	20Ω *	±20Ω			* Resistance of both primaries.
L7	2nd FM IF	.4Ω	.4Ω	95-1150		± Resistance of both secondaries.
L8	2nd AM IF	20.5Ω	20.5Ω	95-1102		
L9	3rd FM IF	1Ω		8-14509		
L10	Disc. Trans.	.3Ω	.3Ω	95-1153		

PARTS LIST AND DESCRIPTIONS (Continued)

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: SYLVANIA PART No.		NOTES
M1	.087A	212-7	NC-5		

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M2	Switch	85-430	Band
M3	Indicator Bulb	100-105	Neon
M4	3 Gang Var. Cap.	22-1742	(16-464MMF, 34-204MMF)
	Dial Scale	26-419	
	Dial Pointer	59-146	
	Dial Glass	192-117	
	Cabinet	14-861	White
	Cabinet	14-1122